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## ABSTRACT

This study merged and expanded data from two research databases containing information on former students with mental retardation ranging from mild (N=34) to moderate (N=78) to severe (N=86). Data were obtained from the "Benefit-Cost Evaluation Project" and the "Post School Transition Project." The subjects came from different educational environments and had been out of school for comparable amounts of time (1 to 5 years). The study assessed the costs of special education services for these samples and linked these measures to yield benefit-cost and cost-effectiveness analyses for evaluating the possible efficiency of such services in terms of post-school outcomes of young adults with mental retardation. The study concluded that: (1) environmental variables and opportunity factors played a significant role in post-school outcomes; (2) differences in outcomes were lacking between men and women; (3) a strong factor in predicting economic outcomes for persons with mental retardation is the severity of the retardation; (4) there is a need for location-specific information on outcomes (particularly employment rate) for comparable age groups without handicaps; and (5) it is possible to employ both effectiveness-cost and benefit-cost evaluation techniques to assess the efficiency of special education services for persons with severe retardation. (Includes 75 references.) (JDD)

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Robert H. Bruininks, Darrell R. Lewis, and Martha L. Thurlow

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Report #90-1 • January 1990

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The Institute on Community Integration  
*University of Minnesota*

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## Abstract

This report summarizes the results of a major integrative research project, funded by the U.S. Office of Special Education and Rehabilitative Services, which had as its goal the merging of two existing data sets and their expansion through the collection of additional data related to the outcomes and costs of special education. Samples of former students with mild ( $n=34$ ), moderate ( $n=78$ ), and severe mental retardation ( $n=86$ ) who had been out of school from one to five years were included in the comprehensive follow-up, cost-effectiveness, and benefit-cost analyses. Major conclusions included the documented influence of environmental variables, opportunity factors, and severity of retardation for post-school outcomes, and the noninfluence of gender. The need for location-specific information on outcomes was confirmed in comparisons of former students from urban and suburban settings. The applicability of effectiveness-cost and formal benefit-cost frameworks for assessing the efficiency of special education programs, also was confirmed with the finding of differential cost savings in two special education programs and evidence for the benefits and savings to society of providing special education services to students with severe levels of mental retardation.

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## CHAPTER 1

### Overview

**Robert H. Bruininks, Martha L. Thurlow, and Darrell R. Lewis**

In 1986, a project was funded by the Office of Special Education Programs, U.S. Office of Special Education and Rehabilitative Services, to build on two research data bases and to address issues related to post-school outcomes and costs of special education programs for youngsters with mental retardation. This two-year project, entitled "Transitional and Benefit-Cost Characteristics of Special Education Programs for Students with Mental Retardation," encompassed several activities that significantly increased our knowledge base about what happens to students after they leave school. It also helped to further delineate the relationships between educational outcomes and costs for students with handicaps.

The research in this report was undertaken to address critical issues related to the transition of youth with handicaps from school to the work place and community living. The process by which individuals with handicaps move from schooling toward integration and employment in society has become a key concern of educators and policy makers in the past several years. Some of the need for attention to the transition process and to more accessible services is emphasized by demographic changes in the U.S. population during the past 10 years. These dramatic changes are reflected in a higher average number of U.S. adult citizens compared to preceding decades, as well as a trend toward increased average ages of persons with handicaps. Thus, continuing demographic changes are creating a growing need to address the transition from secondary special education to adult services and the expanded need for employment and adult services programs (Bruininks, Lakin, & Hill, 1984).

Historically, our information about the transition of individuals with handicaps has been minimal. Although many studies have been conducted on the occupational and community adjustment of adults with retardation, most have focused on adults with mild retardation. Further, most were completed many years ago, and they provided mixed results on dimensions of employment and community integration (cf. Baller, Charles, & Miller, 1967; Bruininks, Meyers, Sigford, & Lakin, 1981; Cobb, 1972; Edgerton, 1967, 1969; Goldstein, 1964; Kennedy, 1966). Only recently have efforts been made to evaluate the benefits derived from special education services (e.g., Fardig, Algozzine, Schwartz, Hensel, & Westling, 1985; Hasazi, Gordon, & Roe, 1985; Mithaug, Horiuchi, & Fanning, 1985; Semmel, Cosden, & Konopak, 1985; Wehman, Kregel, & Seyfarth, 1985).

In addition to concerns about better follow-up information on students who have been in special education programs since the enactment of PL 94-142, there is growing concern in special education with the need to be able to document the relationships between costs and long-term benefits that accrue within a broader social context. Such long-term benefits include those received by the student (e.g., economic self sufficiency, personal adjustment, community involvement, self esteem) and those derived by society in general (e.g., increased tax collections, decreased use of public assistance programs, reduced rates of institutionalization). To date, a lack of outcome data combined with

inadequate methodologies have prevented useful evaluations of the relationships between outcomes and costs of special education programs.

Benefit-cost analysis is an economic accounting procedure that involves weighing and quantifying both the costs and the benefits of a particular program, and deriving an estimate of the program's efficiency. In some cases, when it is impossible to assign quantitative values to all benefits and costs, the more limited tool of cost-effectiveness analysis is used. In this case, the costs of achieving key outcomes are identified and compared across programs to assess relative efficiency. The primary issue addressed by benefit-cost and cost-effectiveness analyses is whether the various outcomes of a program justify their costs in terms of economic efficiency and quality of life factors. This is a crucial question for special education programs.

Of the recent studies that have followed special education students after they have left school, only one has looked at the relationships between costs and benefits. This study (Lewis, Bruininks, Thurlow, & McGrew, 1988a) applied a benefit-cost methodology to link outcome and cost data for a program serving students with mild mental retardation. At a level of analysis employing earnings functions, Lewis et al. found that it costs society approximately \$9 in special education services to generate \$1.30 in annual earnings, which over the work life results in special education benefits almost twice as great as their costs. Furthermore, special education services were found to be cost-beneficial when compared to a number of hypothetical alternatives, including institutionalization, dropping out of school, and unemployment rates. The authors concluded that "special education for children and youth with mental retardation appears to be 'worth its cost,' even if we include only those post-school effects that can be valued in monetary terms" (p. 215). This conclusion, of course, is limited to students with mild mental retardation included in this initial study.

#### Original Data Bases

Two research data bases had been developed prior to beginning the current investigation. One data base was constructed as part of the "Benefit-Cost Evaluation Project," which was funded by the Office of Special Education Programs in 1984. Another data base was constructed as part of the "Post School Transition Project" which was funded by the National Institute of Disability and Rehabilitation Research in 1986. The Benefit-Cost Evaluation Project included very detailed information on costs and their relationship to certain outcomes. The Post-School Project obtained very rich information on outcomes, but no cost data were collected. By adding the Benefit-Cost and Post-School data bases, expanding the outcomes data in the first, and collecting cost data for the second, a very rich source of benefit-cost and outcome data on public school programs for students with mental retardation could be analyzed.

As part of the Benefit-Cost Evaluation Project, detailed outcome data were collected via a mailed questionnaire for students with mild handicaps ( $n=466$ ), as well as for students who were not handicapped ( $n=481$ ). All students had been out of school from 1 to 8 years (see Bruininks, Thurlow, Lewis, & Larson, 1988). An interview procedure was used with a sample of 61 students with mild mental retardation to obtain more specific information related to employment, education, day program participation, living arrangements, leisure

activities, support program use, citizenship and other living skills (see Hagstrum, 1987). Further, the Inventory for Client and Agency Planning (ICAP) was used to obtain information on functional limitations, adaptive behavior, problem behaviors, and service levels. In addition, detailed cost data were collected for programs serving students in specific program areas (see Lewis, Bruininks, & Thurlow, 1988d). Outcome data, however, were not obtained for students with moderate and severe levels of mental retardation; they were served by a special education cooperative district outside the regular school district. Further, cost data for these groups were based only on school district contracted costs. More detailed information was needed from the cooperative district to complete the further analyses conducted for this study.

As part of the Post-School Transition Project, outcome data were collected via interview (same as used in Benefit-Cost Project) and ICAP for 87 former students with moderate to severe levels of mental retardation who had been out of school 1 to 10 years (see Thurlow, Bruininks, & Lange, 1989). Benefit-cost analyses were not part of funded activities. Thus, cost data were not collected.

#### Data Expansion Activities

The focus of data expansion activities included: (a) collecting interview and ICAP information for a suburban sample of students with moderate to severe mental retardation (see Thurlow, Bruininks, Wolman, & Steffens, 1989), (b) collecting more detailed cost data for the new suburban sample, (see Lewis, Bruininks, & Thurlow, 1988a), (c) collecting cost data for the Post-School (urban) sample of students with moderate to severe mental retardation (see Lewis, Bruininks, & Thurlow, 1988a), and (d) collecting, if possible, interview and ICAP data for a small sample of urban students with mild mental retardation. These data then were merged to form a complete data set for the current investigation. The total data sample numbered 262 former students. Because different samples varied in the amount of time out of school, (from 1 to 8 years for the Benefit-Cost sample, from 1 to 10 years for the Post-School sample, and from 1 to 5 years for the new suburban sample), descriptions and analyses in the current investigation were limited to those former students who had been out of school 1 to 5 years. This resulted in a total sample of 200.

#### Summary

Local schools and rehabilitation agencies need evaluation data that will help them identify implications for modifying their programs and improving transition services. This includes the development of important and timely evaluation data on outcomes of schooling and adjustment of young adults with handicaps. There is a particular need for studies focusing on the critical transition years when individuals enter young adulthood, and for information on adjustment of older cohorts. Such information can provide a sound empirical foundation for improving secondary programs, for developing critical transition programs for students leaving schools, for structuring more useful evaluations, and for identifying continuing needs of people for building more effective school and rehabilitation services.

## CHAPTER 2

### Transition-Related Outcomes of Former Students with Mental Retardation up to Five Years After Leaving School

Martha L. Thurlow, Robert H. Bruininks, and Darrell R. Lewis

Available information about the transition of individuals with handicaps has been variable in its usefulness. Many studies conducted prior to the 1970s followed individuals with mental retardation after "some" years of schooling. The context in which transition occurred for these individuals was, of course, very different from what exists today. Most relevant today is information about former students who have been in special education programs since 1975, when Public Law 94-142 was first enacted. Recent studies that have focused on the occupational and community adjustment of former students in special education have included primarily those individuals with mild mental retardation (e.g., Fardig et al., 1985; Hasazi et al., 1985; Mithaug et al., 1985; Semmel et al., 1985; Wehman et al., 1985). Recent studies of the post-school status of students with moderate to severe handicaps have been relatively few in number (e.g., Edgar, 1987; Hasazi et al., 1985; Hawkins, 1984; Wehman et al., 1985).

Thus, there continues to be a need for information on the outcomes of schooling and adjustment of young adults with mental retardation across the range of disabilities. Ideally, the information would come from samples studied at approximately the same point in time, at comparable states of transition from schooling, and within the same geographic areas.

General information obtained from mailed questionnaires about post-school outcomes for students with various conditions considered to constitute mild handicaps has been presented by Bruininks, Thurlow, Lewis, and Larson (1988). Included in that report is information on students with mild mental retardation. Further indepth interview data were obtained on this subsample (see Hagstrum, 1987). Thurlow, Bruininks, and Lange (1989) have reported findings from interviews of informed respondents for samples of former students in an urban school district who had moderate and severe levels of mental retardation. Thurlow, Bruininks, Wolman, and Steffens (1989) provide detailed outcome information on former students with moderate to severe/profound mental retardation in a cooperative school district that served nine school districts in suburban and rural communities.

Data sets from these groups are merged in the present report. In addition, only selected variables have been included here, to get at some of the more critical dimensions of post-school adjustment. Within each level of mental retardation (mild, moderate, severe), comparisons in outcomes are made as a function of gender, since this has been found in some studies to influence post-school outcomes (e.g., Fardig et al., 1985; Hasazi et al., 1985; Kranstover, Thurlow, & Bruininks, in press; Mithaug et al., 1985). Typically, differences in economic outcomes have favored males over females. These studies, however, have focused on samples of former students with mild handicaps. In addition to

gender comparisons, comparisons have been made as a function of the severity of the former students' mental retardation.

The critical variables included in the present investigation are: (a) employment rate and type, (b) earned income, (c) support payments, (d) living arrangements, (e) daytime activities, (f) friendships, (g) recreation/leisure activities, (h) shopping skills (selects, pays), (i) banking skills (has savings account, uses savings account, has checking account, uses checking account), and (j) telephone use. Thus, in addition to the typical outcome variables (e.g., employment rate, income), information was collected on variables reflecting functioning within the community and within important social networks.

### Method

#### Subjects

Three groups of subjects were included in the present investigation. They were from three school districts in the Minneapolis-St. Paul metropolitan area. District A was a large suburban district; District B was a large urban district; and District C was a large regional school district that provided special education services primarily to students with moderate and severe mental retardation from nine suburban school districts. (District A was also a member of District C.)

A total of 34 students with mild mental retardation was included in analyses, with 26 subjects from District A who were in the classes of 1981 to 1984, and 8 subjects from District B who were in the classes 1982 to 1986. These subjects were drawn from a pool of 54 students for whom interviews were conducted; those more than five years out of school were dropped to maintain consistent sample characteristics.

A second group of subjects included 78 students with moderate mental retardation who had been out of school from 1 to 5 years. These students came from either District B ( $n=28$ ) or District C ( $n=50$ ). Subjects in District B were selected from a larger sample of 41 students who had been out of school from 1 to 10 years. Again, to maintain consistency across samples, those former students who had been out of school more than five years were not included in the present investigation.

Former students with severe levels of mental retardation formed the third group of subjects included in the present analysis. A total of 86 former students (30 District B, 56 District C) who had been out of school from 1 to 5 years was included. Subjects in the District B group were selected from a larger sample of 46 students who had been out of school from 1 to 10 years.

Gender and age information for the three groups of subjects is included in Table 2-1. As is evident in this table, the distributions were fairly similar for individuals with moderate and severe mental retardation. Individuals with mild mental retardation differed from these two groups; on the average, they were younger and included a larger percentage of males.

Table 2-1

## GENDER AND AGE INFORMATION

|                      | Mild   |        |       | Moderate |        |       | Severe |        |       |
|----------------------|--------|--------|-------|----------|--------|-------|--------|--------|-------|
|                      | Dist A | Dist B | Total | Dist B   | Dist C | Total | Dist B | Dist C | Total |
| <u>Gender</u>        |        |        |       |          |        |       |        |        |       |
| Male                 | 14     | 7      | 21    | 14       | 30     | 44    | 15     | 33     | 48    |
| Female               | 12     | 1      | 13    | 14       | 20     | 34    | 15     | 23     | 38    |
| Total                | 26     | 8      | 34    | 28       | 50     | 78    | 30     | 56     | 86    |
| <u>Age (Months)*</u> |        |        |       |          |        |       |        |        |       |
| Mean                 | 266.4  | 253.6  | 263.3 | 299.9    | 291.3  | 294.4 | 311.0  | 291.5  | 298.3 |
| SD                   | 15.6   | 22.6   | 18.0  | 24.9     | 19.7   | 21.9  | 31.1   | 18.9   | 25.5  |
| N                    | 25     | 8      | 33    | 28       | 50     | 78    | 30     | 56     | 86    |

\* Age information presented here is derived from the ICAP. This information was not available for one subject with mild mental retardation from District A.

Available information about intellectual functioning of the former students varied as a function of the school district in which the individuals had been students. Those in District B had either (a) a recorded test score from the Stanford Binet Intelligence Test or the WISC-R (Full Scale), or (b) a classification (e.g., "severe") listed. Groupings of these former students, therefore, were made by level of functioning categories. For former students with a Binet score, the mild group was considered to include those subjects whose scores fell between 52 and 67. The subjects in the moderate group had scores that fell in the 36 to 51 range. And, those assigned the severe classification had scores in the 20 to 35 range. A few persons whose estimated scores fell below 20 were excluded from the study. For subjects with a WISC-R score, the mild group included those with scores in the 55 to 69 range. Former students with scores between 40 and 54 were classified as belonging to the moderate group. And, those with scores in the 25 to 39 range were considered to have severe mental retardation. Anyone whose score fell below 25 on the WISC-R was not included in the study.

For students in District C, intellectual functioning was measured primarily by the Leiter International Performance Scale. Subjects who did not have Leiter scores sometimes had Stanford Binet or WISC-R scores. For classification into groups of students with either moderate or severe mental retardation, the division score was established as 46 on the Leiter (scores of 46 or above resulted in the student being included in the group with moderate mental retardation; scores below 46 resulted in the student being included in the group with severe mental retardation). When scores were very close to this cutoff point or were quite high, however, other data (e.g., adaptive behavior scores on a standardized scale) were examined to confirm group placement. This secondary rule resulted in the dropping of two subjects because of higher than typical levels of intellectual functioning and adaptive functioning. When no data on intellectual functioning were available for decision making, a school administrator was asked to state a classification, based on accepted criteria in the professional literature (Grossman, 1983); this classification was confirmed by examining the standardized adaptive behavior information. After the application of these decision rules, the average intellectual functioning (Leiter) scores of the District C sample were 55.3 (SD = 7.0) for the former students with moderate mental retardation ( $n = 44$ ), and 36.3 (SD = 6.3) for the former students with severe mental retardation ( $n = 35$ ).

### Instruments

Two instruments were used in the study. The first instrument was the structured interview protocol originally developed as part of the Post-School Transition Project (see Thurlow, Bruininks, & Lange, 1989). The second instrument was the Inventory for Client and Agency Planning (ICAP) (Bruininks, Hill, Weatherman, & Woodcock, 1986). Each is described briefly here.

Interview. The Post-School Transition Survey Interview was designed to gather information on a person's transition from school to adult life after high school. It is based on input from: (a) a survey of practitioners nationwide about follow-up information considered important for use by programs and managers to plan for the needs of students in special education (see Lange, Thurlow, & Bruininks, 1988), (b) a review of instruments used by other post-school transition and follow-up projects in the U.S., and (c) a task force

of school district officials and project personnel. Considerations and the steps in the development of the interview are described in detail by Thurlow, Bruininks, and Lange (1989). The original interview included 11 sections designed to gather information about the former student's day to day life since leaving high school; one of these sections was dropped completely for this investigation (job search) and another was shortened considerably (past employment). The general variables of interest in the present investigation are:

|                     |               |
|---------------------|---------------|
| Employment rate     | Friendship    |
| Income              | Citizenship   |
| Daytime activity    | Living Skills |
| Living arrangements |               |

In addition to these sections, demographic data were collected on the subject's birth date, date of interview, respondent's name, respondent's relationship to subject, and length of time the respondent had known the subject.

Inventory for Client and Agency Planning (ICAP). The ICAP was developed as a tool for managing information in areas for planning and evaluating services for individuals with disabilities and elderly people. In addition to information on a subject's diagnostic and health status, functional limitations, and demographics, this instrument provides normative scores for adaptive behavior and problem behaviors, information on service level, service history, current placements and projected service needs, and data on support services and social-leisure activities. For this investigation, only the sections on functional limitations and needed assistance, adaptive behavior, and problem behaviors were used. With these sections, it is possible still to obtain normative scores on four domains of independence (Motor Skills, Social and Communication Skills, Personal Living Skills, and Community Living Skills), as well as for total independence, and four indexes of maladaptive behavior (Internalized Maladaptive, Asocial Maladaptive, Externalized Maladaptive, General Maladaptive). It is also possible with the collected information to obtain an overall Service Score that reflects need for care, support, supervision, or training. Normative data for the adaptive behavior and problem behavior sections of the ICAP were gathered from nearly 2000 subjects in 40 communities distributed throughout the U.S. The norming sample was selected to be as representative as possible of the U.S. population from age 3 months to 40 years and older. Stratifying variables included sex, race and Hispanic status, geographic region, and size of community; for adults, occupational and educational background also were stratifying variables.

#### Procedure

For this investigation, procedures established for the Post-School Transition Project were followed so that information collected on the sample students in that study could be merged with the newly collected information on students in the other districts. For all former students, basic procedures involved administration of the ICAP and the follow-up interview.

For former students with moderate and severe mental retardation, informed respondents were interviewed and completed the ICAP. For former students with mild mental retardation, the former students themselves were interviewed and an informed respondent (usually a parent) completed the ICAP. In these cases, an abbreviated form of the interview also was administered to an informed respondent in order to check the validity of responses to some of the items involving time recollections or amounts of money. For two of the individuals with mild mental retardation, informed respondent interviews were used because the former students did not want to be interviewed but agreed to have a parent interviewed.

Interviewers were six individuals (project coordinators or graduate research assistants) who were experienced in working with persons with mental retardation and their families. All were provided with special training during four two-hour sessions. During these sessions, interviewers were given a general overview of the study, an introduction to interview techniques (including a video on interviewing techniques and strategies; Mathematica, 1982), and an explanation and detailed look at the instruments. This information was followed by role-playing of interviews with an experienced observer, and with observation of an experienced interviewer during an actual interview. After completion of training, an experienced interviewer accompanied each newly trained interviewer to the first interview to provide feedback and evaluation.

Parents, caregivers, or former students themselves were contacted by phone to set up interview appointments. At this time, the required amount of time was explained, and the participant was told there would be a \$10 gratuity. Most participants preferred to be interviewed in their homes or residences, although some preferred a neighborhood location such as a restaurant or community center.

### Response Rates

In the initial Post-School Transition Project, considerable time was spent locating subjects. The final response rate in that study was 92.5% for the former students with moderate and severe mental retardation; this reflected 3 former students who could not be located and 2 who refused to participate. For former students with mild mental retardation, the final response rate was 77.2% of those who could be located. Nearly one-third of the original sample of 85 could not be located. Refusal rate was 22.8%. The lower response rates for former students with milder handicaps are consistent with findings of other follow-up studies that report response rates, even those requiring less involvement through use of mailed questionnaires (see Bruininks, Thurlow, Lewis, & Larson, 1988; Bruininks, Wolman, & Thurlow, 1987, 1989).

Response rates for the newly added subject groups were fairly similar to those in the original samples. For the former students with moderate to severe mental retardation, the overall response rate was 70.6%, reflecting 28 failures to locate the subjects, 1 deceased subject, and 16 subjects (or their informed respondents) who refused participation. For the former students with mild mental retardation, the response rate was 64.9%, reflecting 12 unlocated subjects and 6 refusals. These response rates should be considered quite high by normal survey research standards (Bruininks, Wolman, & Thurlow, 1989).

### Data Analysis

The merged data set (including existing data and newly collected data) was examined descriptively in terms of level of functioning, gender, and district. Repeated measures analyses of variance (Level of mental retardation X Gender) and chi-square statistics were run for level of functioning and gender comparisons. The main focus of merging the data, however, was to be able to conduct larger benefit-cost and cost-effectiveness analyses. Those analyses are presented in Chapter 3.

### Results

#### Functioning Level Information

Information on the former students' level of functioning was obtained primarily through the administration of the ICAP. This instrument provided information on the former students' functional limitations, adaptive behavior, and problem behaviors that could be compared with those of normative samples. Average W scores on four adaptive behavior scales and the Broad Independence Index, and standardized scores on three problem behavior scales and the General Maladaptive Index (with higher negative scores reflecting more significant problem behaviors) and the Service Score (Bruininks et al., 1986) are presented in Table 2-2. As these scores indicate, the samples from the two districts within each level of mental retardation are quite similar. Functioning level information for males and females in the three groups is presented in Table 2-3. Few differences are evident in these data. For only one variable was a statistically significant difference found between males and females: Social/Communication Skills,  $F(1, 191) = 7.63, p < .01$ , with females obtaining a significantly higher score on this variable than males.

In both Table 2-2 and Table 2-3, it is obvious that adaptive behavior scores show a consistent decrease with increased severity of mental retardation. For example, average Broad Independence scores decrease for persons with mild, moderate, and severe levels of mental retardation from 522.9 to 497.2 to 456.3, respectively. In contrast, the maladaptive behavior scores increased in severity with the severity in level of mental retardation. Average general maladaptive scores for persons with mild, moderate, and severe levels of mental retardation were -2.7, -8.7, and -14.3, respectively. These scores reflected relatively mild degrees of behavior problems. Those persons with severe mental retardation, and the most extreme maladaptive behavior scores, fell within the moderately serious range (between 1 and 2 standard deviations below the standardization population mean); the scores for groups with less severe mental retardation fell within a normal range. The observations of differences are confirmed by statistical comparisons. A statistically significant difference as a function of level of mental retardation was found for each of the variables: Motor Skills,  $F(2, 191) = 49.10, p < .001$ ; Personal Skills,  $F(2, 191) = 73.47, p < .001$ ; Social/Communication Skills,  $F(2, 191) = 96.71, p < .001$ ; Community Skills,  $F(2, 191) = 117.58, p < .001$ ; Broad Independence Score,  $F(2, 191) = 104.74, p < .001$ ; Internalized Maladaptive,  $F(2, 191) = 13.22, p < .001$ ; Externalized Maladaptive,  $F(2, 191)$

Table 2-2  
FUNCTIONING LEVEL INFORMATION

|                                    | Mild   |        |       | Moderate |        |       | Severe |        |       |
|------------------------------------|--------|--------|-------|----------|--------|-------|--------|--------|-------|
|                                    | Dist A | Dist B | Total | Dist B   | Dist C | Total | Dist B | Dist C | Total |
| <u>Motor Skills</u>                |        |        |       |          |        |       |        |        |       |
| Mean                               | 507.8  | 503.5  | 506.8 | 474.1    | 497.6  | 489.2 | 462.7  | 442.1  | 449.3 |
| SD                                 | 28.3   | 29.5   | 28.2  | 24.1     | 27.4   | 28.5  | 28.1   | 39.3   | 36.9  |
| <u>Personal Skills</u>             |        |        |       |          |        |       |        |        |       |
| Mean                               | 536.9  | 520.4  | 532.9 | 503.5    | 517.5  | 512.5 | 482.3  | 474.3  | 477.1 |
| SD                                 | 20.1   | 26.0   | 22.4  | 17.6     | 16.1   | 17.8  | 18.7   | 36.6   | 31.7  |
| <u>Social/Communication Skills</u> |        |        |       |          |        |       |        |        |       |
| Mean                               | 525.5  | 512.8  | 522.4 | 482.1    | 495.6  | 490.7 | 456.0  | 442.8  | 447.4 |
| SD                                 | 29.4   | 30.1   | 29.6  | 25.6     | 29.6   | 28.8  | 16.9   | 33.6   | 29.5  |
| <u>Community Skills</u>            |        |        |       |          |        |       |        |        |       |
| Mean                               | 535.4  | 510.2  | 529.3 | 483.7    | 502.9  | 496.0 | 454.5  | 448.8  | 450.8 |
| SD                                 | 26.4   | 17.8   | 26.6  | 24.3     | 22.8   | 25.0  | 16.5   | 34.3   | 29.4  |
| <u>Broad Independence Score</u>    |        |        |       |          |        |       |        |        |       |
| Mean                               | 526.4  | 512.0  | 522.9 | 486.0    | 503.5  | 497.2 | 464.1  | 452.1  | 456.3 |
| SD                                 | 21.5   | 23.9   | 22.6  | 18.2     | 18.6   | 20.2  | 17.6   | 33.6   | 29.4  |
| <u>Internalized Maladaptive</u>    |        |        |       |          |        |       |        |        |       |
| Mean                               | -1.7   | -1.4   | -1.6  | -3.9     | -6.6   | -5.7  | -12.1  | -10.5  | -11.1 |
| SD                                 | 6.9    | 3.1    | 6.2   | 9.0      | 8.9    | 9.0   | 12.1   | 10.2   | 10.9  |
| <u>Externalized Maladaptive</u>    |        |        |       |          |        |       |        |        |       |
| Mean                               | -1.6   | 1.0    | -1.4  | -4.0     | -3.7   | -3.8  | -9.4   | -7.8   | -8.4  |
| SD                                 | 5.0    | 2.3    | 4.5   | 12.6     | 10.8   | 11.4  | 11.6   | 12.4   | 12.1  |
| <u>Asocial Maladaptive</u>         |        |        |       |          |        |       |        |        |       |
| Mean                               | -1.8   | 1.5    | -1.0  | -7.0     | -8.2   | -7.8  | -13.6  | -12.2  | -12.7 |
| SD                                 | 9.7    | 2.8    | 8.6   | 13.1     | 9.6    | 10.9  | 11.8   | 12.4   | 12.2  |
| <u>General Maladaptive</u>         |        |        |       |          |        |       |        |        |       |
| Mean                               | -3.0   | -1.8   | -2.7  | -8.2     | -8.9   | -8.7  | -15.5  | -13.8  | -14.3 |
| SD                                 | 5.4    | 1.6    | 4.8   | 12.9     | 8.6    | 10.3  | 12.2   | 12.1   | 12.1  |
| <u>Service Score</u>               |        |        |       |          |        |       |        |        |       |
| Mean                               | 90.4   | 86.5   | 89.4  | 71.8     | 78.2   | 75.9  | 55.3   | 51.9   | 53.1  |
| SD                                 | 9.7    | 7.7    | 9.3   | 15.2     | 11.2   | 13.1  | 12.9   | 20.5   | 18.2  |
| Total N                            | 25     | 8      | 33    | 28       | 50     | 78    | 30     | 56     | 86    |

<sup>a</sup> ICAP information was available only for 25 individuals with mild mental retardation from District A.

Table 2-3

## FUNCTIONING LEVEL INFORMATION FOR MALES AND FEMALES

|                                    | Mild  |        | Moderate |        | Severe |        |
|------------------------------------|-------|--------|----------|--------|--------|--------|
|                                    | Male  | Female | Male     | Female | Male   | Female |
| <u>Motor Skills</u>                |       |        |          |        |        |        |
| Mean                               | 506.1 | 507.8  | 488.7    | 489.7  | 452.1  | 445.7  |
| SD                                 | 24.7  | 34.7   | 27.1     | 30.6   | 35.1   | 39.4   |
| <u>Personal Skills</u>             |       |        |          |        |        |        |
| Mean                               | 529.6 | 538.7  | 510.2    | 515.4  | 480.9  | 472.3  |
| SD                                 | 23.2  | 20.6   | 16.8     | 19.0   | 29.7   | 33.7   |
| <u>Social/Communication Skills</u> |       |        |          |        |        |        |
| Mean                               | 515.0 | 535.3  | 484.4    | 498.9  | 446.0  | 449.3  |
| SD                                 | 29.0  | 27.1   | 28.7     | 27.2   | 28.4   | 31.1   |
| <u>Community Skills</u>            |       |        |          |        |        |        |
| Mean                               | 523.5 | 539.4  | 493.7    | 499.0  | 452.6  | 448.6  |
| SD                                 | 25.2  | 27.0   | 26.2     | 23.5   | 26.2   | 33.2   |
| <u>Broad Independence Score</u>    |       |        |          |        |        |        |
| Mean                               | 518.6 | 530.5  | 494.4    | 500.9  | 458.0  | 62.5   |
| SD                                 | 21.2  | 24.0   | 19.3     | 20.9   | 27.6   | 37.4   |
| <u>Internalized Maladaptive</u>    |       |        |          |        |        |        |
| Mean                               | -2.1  | -0.7   | -5.6     | -5.7   | -11.7  | -10.3  |
| SD                                 | 6.9   | 4.9    | 7.8      | 10.5   | 12.3   | 8.8    |
| <u>Externalized Maladaptive</u>    |       |        |          |        |        |        |
| Mean                               | 1.9   | -0.6   | -4.8     | -2.6   | -9.5   | -6.9   |
| SD                                 | 2.3   | 6.9    | 11.6     | 11.1   | 12.5   | 11.6   |
| <u>Asocial Maladaptive</u>         |       |        |          |        |        |        |
| Mean                               | -0.9  | -1.1   | -7.9     | -7.7   | -13.1  | -12.2  |
| SD                                 | 8.9   | 8.6    | 11.3     | 10.6   | 12.6   | 11.8   |
| <u>General Maladaptive</u>         |       |        |          |        |        |        |
| Mean                               | -2.6  | -2.9   | -9.1     | -8.1   | -15.3  | -13.2  |
| SD                                 | 3.9   | 6.2    | 10.2     | 10.6   | 13.0   | 10.8   |
| <u>Service Score</u>               |       |        |          |        |        |        |
| Mean                               | 88.4  | 91.2   | 74.4     | 77.8   | 53.1   | 53.0   |
| SD                                 | 7.9   | 11.5   | 13.4     | 12.6   | 19.2   | 17.2   |
| Total N                            | 21    | 12     | 44       | 34     | 48     | 38     |

= 9.22,  $p < .001$ ; Asocial Maladaptive,  $F(2, 191) = 12.66$ ,  $p < .001$ ; General Maladaptive,  $F(2, 191) = 14.68$ ,  $p < .001$ ; Service Score,  $F(2, 191) = 83.65$ ,  $p < .001$ .

### Employment Outcomes

Table 2-4 provides a description of general outcomes related to employment and income. Distinct differences are evident as a function of level of mental retardation, with 82% of those with mild mental retardation employed, 75% of those with moderate mental retardation employed, and 52% of those with severe mental retardation employed. The nature of employment differed also, with 74% of those with mild mental retardation in competitive or supported employment, 29% of those with moderate mental retardation in competitive or supported employment, and 6% of those with severe mental retardation in competitive or supported employment,  $\chi^2(4) = 60.66$ ,  $p < .001$ . Average income per month reflected these trends in job status. Of those employed, the average monthly income was \$395.57 for those with mild mental retardation, \$204.47 for those with moderate mental retardation, and \$69.51 for those with severe mental retardation. And, income from SSI and Disability showed the opposite trend, with average income from these support payments being \$33.58 for those with mild mental retardation, \$131.26 for those with moderate mental retardation, and \$151.88 for those with severe mental retardation. Repeated measures analysis of variance showed statistically significant effects for level of mental retardation: Income Per Month,  $F(2, 167) = 34.54$ ,  $p < .001$ ; SSI and Disability Per Month,  $F(2, 167) = 9.20$ ,  $p < .001$ .

Information on employment outcomes for males and females is presented in Table 2-5. Overall, approximately 26% of males and 28% of females were involved in competitive employment; 25% of males and 33% of females were unemployed. Income per month and support income per month (SSI and Disability) were generally comparable in amounts for males and females. None of the statistical comparisons by gender was statistically significant.

Also evident in the employment information are differences between school districts. For former students with mild mental retardation, monthly income was greater for District A, reflecting the larger percentage in competitive employment. For former students with moderate retardation, percentages employed, percentages in competitive employment, and monthly earnings favored District C, as did lower support payments. For former students with severe mental retardation, employment rate differences favored District C again, with 71% employed (compared to 28% in District B). However, differences in competitive employment and monthly income were minimal, and support payments received were considerably greater for District C individuals.

### Living Arrangements and Daytime Activities

Living arrangements and daytime activities were scaled from those considered to be least independent (e.g., living in institution, not involved in any formal program) to those considered to be most independent (e.g., living alone or with friends, in competitive employment). These scores and distributions are shown in Table 2-6.

Table 2-4  
EMPLOYMENT OUTCOMES<sup>a</sup>

|                                                 | Mild    |        |         | Moderate |         |         | Severe  |         |         |
|-------------------------------------------------|---------|--------|---------|----------|---------|---------|---------|---------|---------|
|                                                 | Dist A  | Dist B | Total   | Dist B   | Dist C  | Total   | Dist B  | Dist C  | Total   |
| <u>Employment<sup>b</sup></u>                   |         |        |         |          |         |         |         |         |         |
| Competitive                                     | 20(91%) | 4(50%) | 24(80%) | 3(11%)   | 21(44%) | 24(32%) | 2(7%)   | 4(7%)   | 6(7%)   |
| Sheltered                                       | 1(4%)   | 3(38%) | 4(13%)  | 11(39%)  | 25(52%) | 36(47%) | 10(33%) | 36(65%) | 46(54%) |
| Not Employed                                    | 1(4%)   | 1(12%) | 2(7%)   | 14(50%)  | 2(4%)   | 16(21%) | 18(60%) | 15(27%) | 33(39%) |
| <u>Income Per Month<sup>c</sup></u>             |         |        |         |          |         |         |         |         |         |
| Mean                                            | 456.12  | 213.93 | 395.57  | 133.89   | 229.27  | 204.47  | 71.46   | 68.64   | 69.51   |
| SD                                              | 244.11  | 165.01 | 224.34  | 107.81   | 168.70  | 159.8   | 73.30   | 94.44   | 87.52   |
| N                                               | 21      | 7      | 28      | 13       | 37      | 50      | 12      | 27      | 39      |
| <u>SSI and Disability Per Month<sup>d</sup></u> |         |        |         |          |         |         |         |         |         |
| Mean                                            | 31.12   | 41.29  | 33.58   | 194.35   | 92.21   | 131.26  | 128.06  | 165.90  | 151.88  |
| SD                                              | 88.13   | 82.13  | 86.68   | 134.48   | 122.55  | 135.79  | 155.42  | 135.72  | 143.56  |
| N                                               | 25      | 8      | 33      | 26       | 42      | 68      | 30      | 51      | 81      |

<sup>a</sup> Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Employment variables are defined as follows: Competitive = competitive or supervised/supported employment; Sheltered = sheltered workshop or DAC (Day Activity Center) or WAC (Work Activity Center); Not Employed = unemployed and looking for work or unemployed and not looking for work.

<sup>c</sup> Information on income per month is only for those subjects who were employed.

<sup>d</sup> Information on SSI and Disability income per month is based on all subjects for whom information was available.

Table 2-5  
EMPLOYMENT OUTCOMES FOR MALES AND FEMALES<sup>a</sup>

|                                                 | Mild    |         | Moderate |         | Severe  |         |
|-------------------------------------------------|---------|---------|----------|---------|---------|---------|
|                                                 | Male    | Female  | Male     | Female  | Male    | Female  |
| <u>Employment<sup>b</sup></u>                   |         |         |          |         |         |         |
| Competitive                                     | 13(72%) | 11(92%) | 13(30%)  | 11(33%) | 4(8%)   | 2(5%)   |
| Sheltered                                       | 4(22%)  | 0(0%)   | 20(46%)  | 16(48%) | 30(62%) | 16(43%) |
| Not Employed                                    | 1(6%)   | 1(8%)   | 10(23%)  | 6(18%)  | 14(29%) | 19(51%) |
| <u>Income Per Month<sup>c</sup></u>             |         |         |          |         |         |         |
| Mean                                            | 363.50  | 452.70  | 210.55   | 196.08  | 61.05   | 88.54   |
| SD                                              | 263.60  | 235.84  | 161.69   | 160.77  | 70.56   | 118.83  |
| N                                               | 17      | 10      | 33       | 21      | 27      | 12      |
| <u>SSI and Disability Per Month<sup>d</sup></u> |         |         |          |         |         |         |
| Mean                                            | 52.10   | 2.27    | 144.91   | 114.97  | 164.07  | 136.64  |
| SD                                              | 104.66  | 7.54    | 132.61   | 139.90  | 157.16  | 125.00  |
| N                                               | 20      | 11      | 37       | 31      | 45      | 36      |

<sup>a</sup> Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Employment variables are defined as follows: Competitive = competitive or supervised/supported employment; Sheltered = sheltered workshop or DAC (Day Activity Center) or WAC (Work Activity Center); Not Employed = unemployed and looking for work or unemployed and not looking for work.

<sup>c</sup> Information on income per month is only for those subjects who were employed.

<sup>d</sup> Information on SSI and Disability income per month is based on all subjects for whom information was available.

Table 2-6

LIVING ARRANGEMENTS AND DAYTIME ACTIVITY<sup>a</sup>

|                                        | Mild    |        |         | Moderate |         |         | Severe  |         |         |
|----------------------------------------|---------|--------|---------|----------|---------|---------|---------|---------|---------|
|                                        | Dist A  | Dist B | Total   | Dist B   | Dist C  | Total   | Dist B  | Dist C  | Total   |
| <u>Living Arrangements<sup>b</sup></u> |         |        |         |          |         |         |         |         |         |
| <u>Scale Score</u>                     |         |        |         |          |         |         |         |         |         |
| Mean                                   | 3.2     | 3.4    | 3.3     | 2.6      | 2.8     | 2.7     | 2.3     | 2.4     | 2.4     |
| SD                                     | 0.9     | 0.9    | 0.9     | 0.6      | 0.8     | 0.7     | 0.5     | 0.5     | 0.5     |
| N                                      | 25      | 7      | 32      | 26       | 50      | 76      | 30      | 55      | 85      |
| <u>Distribution</u>                    |         |        |         |          |         |         |         |         |         |
| Institution                            | 1(4%)   | 0 -    | 1(3%)   | 1(4%)    | 0 -     | 1(1%)   | 0 -     | 0 -     | 0 -     |
| Group Residence                        | 1(4%)   | 1(14%) | 2(6%)   | 8(31%)   | 20(40%) | 28(37%) | 21(70%) | 30(55%) | 51(60%) |
| Family                                 | 19(76%) | 3(43%) | 22(69%) | 17(65%)  | 21(42%) | 38(50%) | 9(30%)  | 25(45%) | 34(40%) |
| Training                               | 0 -     | 2(29%) | 2(6%)   | 0 -      | 8(16%)  | 8(10%)  | 0 -     | 0 -     | 0 -     |
| Independent                            | 4(16%)  | 1(14%) | 5(16%)  | 0 -      | 1(2%)   | 1(1%)   | 0 -     | 0 -     | 0 -     |
| <u>Daytime Activities<sup>c</sup></u>  |         |        |         |          |         |         |         |         |         |
| <u>Scale Score</u>                     |         |        |         |          |         |         |         |         |         |
| Mean                                   | 6.7     | 5.5    | 6.2     | 3.1      | 5.0     | 4.3     | 3.3     | 3.4     | 3.3     |
| SD                                     | 1.0     | 3.2    | 1.6     | 1.6      | 1.8     | 1.9     | 0.8     | 1.0     | 0.9     |
| N                                      | 22      | 8      | 30      | 28       | 48      | 76      | 30      | 55      | 85      |
| <u>Distribution</u>                    |         |        |         |          |         |         |         |         |         |
| No Formal Program                      | 0 -     | 1(13%) | 1(3%)   | 6(21%)   | 0 -     | 6(8%)   | 0 -     | 0 -     | 0 -     |
| Day Care                               | 0 -     | 0 -    | 0 -     | 0 -      | 2(4%)   | 2(3%)   | 0 -     | 0 -     | 0 -     |
| DAC/WAC                                | 1(5%)   | 1(13%) | 2(7%)   | 14(50%)  | 11(23%) | 25(33%) | 26(87%) | 44(80%) | 70(82%) |
| Sheltered Wksp                         | 1(5%)   | 2(25%) | 3(10%)  | 5(18%)   | 14(29%) | 19(25%) | 2(7%)   | 7(13%)  | 9(11%)  |
| Supported Emplmt                       | 0 -     | 2(25%) | 2(7%)   | 1(4%)    | 1(2%)   | 2(3%)   | 2(7%)   | 2(4%)   | 4(5%)   |
| Competitive                            |         |        |         |          |         |         |         |         |         |
| Employment                             | 20(91%) | 2(25%) | 22(73%) | 2(7%)    | 20(42%) | 22(29%) | 0 -     | 2(4%)   | 2(2%)   |

<sup>a</sup> Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Living arrangement was scaled from independent to most independent using the scale: 1 = institution, hospital, or nursing home, 2 = group residence, 3 = living with family or relative, 4 = apartment training or halfway house, 5 = living independently or with friends. Subjects whose living arrangement was "other" were excluded from these data.

<sup>c</sup> Daytime activity was scaled from least independent to most independent using the scale: 1 = no formal program outside home, 2 = day care, 3 = day or work activity center, 4 = sheltered workshop, 5 = school or volunteer, 6 = supervised or supported employment, 7 = competitive employment. Subjects whose daytime activity was coded as "other" were excluded from these data.

As reflected in the scaled scores, living arrangements varied as a function of the level of mental retardation, from most independent for those with mild mental retardation ( $M = 3.3$ ) to least independent for those with severe mental retardation ( $M = 2.4$ ). The analysis of variance indicated a statistically significant difference for level of mental retardation,  $F(2, 186) = 14.54$ ,  $p < .001$ . Actual distributions indicate that most individuals with mild and moderate mental retardation lived with their families, while most individuals with severe mental retardation lived in group residences. The chi-square test also indicated a significant difference from what would be expected by chance,  $\chi^2(8) = 51.28$ ,  $p < .001$ ; it must be noted, however, that several cells in the distribution were empty. Differences were minimal in the scores and distributions for school districts within each level of mental retardation.

Scaled scores for daytime activities (reflecting a range from no program to competitive employment) varied somewhat as a function of level of mental retardation, from most independent for those with mild mental retardation ( $M = 6.4$ ) to least independent for those with severe mental retardation ( $M = 4.9$ ). Statistical comparison using the repeated measures analysis of variance indicated statistically significant differences,  $F(2, 184) = 37.95$ ,  $p < .001$ , in the scaled scores as a function of level of mental retardation. Similarly, statistical significance in the distribution was suggested by the chi-square test,  $\chi^2(10) = 97.37$ ,  $p < .001$ , which again was limited by the presence of several empty cells.

Within levels of mental retardation, differences between school districts in employment outcomes were evident. Districts A and C were favored over District B.

Living arrangements and daytime activities for males and females are shown in Table 2-7. As indicated by the scaled scores, living arrangements and daytime activities were very similar for males and females within levels of mental retardation. Statistical comparisons of scaled scores and distributions were not significant. Differences among levels of mental retardation were most obvious.

#### Friendships and Recreation/Leisure Activities

Information on the number and variety of friends and recreation/leisure activities is presented in Table 2-8. Individuals with mild and moderate mental retardation averaged about 3 friends, while individuals with severe mental retardation averaged about 2. Variety of friends data were available only for those young adults for whom informed respondents were interviewed. If the subject was the respondent (this occurred only for those subjects with mild mental retardation), this information was not obtained. Variety of friends was fairly similar for individuals with moderate and severe mental retardation, although a little higher for those with moderate retardation in District C. Comparisons for level of mental retardation were not significant for either number or variety of friends.

Recreation/leisure activities were used to form an additive scale involving 10 activities (see Table 2-8). Individuals in the three groups again were fairly similar on this measure, averaging about 7 of the 10 activities during a seven-day period. While comparisons revealed no statistically significant differences as a function of level of mental retardation for the scaled score, differences were found in chi-square analyses of several of the

Table 2-7

## LIVING ARRANGEMENTS AND DAYTIME ACTIVITY FOR MALES AND FEMALES\*

|                                        | Mild    |         | Moderate |         | Severe  |         |
|----------------------------------------|---------|---------|----------|---------|---------|---------|
|                                        | Male    | Female  | Male     | Female  | Male    | Female  |
| <u>Living Arrangements<sup>b</sup></u> |         |         |          |         |         |         |
| <u>Scale Score</u>                     |         |         |          |         |         |         |
| Mean                                   | 3.4     | 2.9     | 2.7      | 2.7     | 2.3     | 2.5     |
| SD                                     | 1.1     | 0.3     | 0.8      | 0.7     | 0.5     | 0.5     |
| N                                      | 19      | 12      | 43       | 33      | 48      | 37      |
| <u>Distribution</u>                    |         |         |          |         |         |         |
| Institution                            | 1(5%)   | 0 -     | 0 -      | 1(3%)   | 0 -     | 0 -     |
| Group Residence                        | 1(5%)   | 1(8%)   | 18(42%)  | 10(30%) | 32(67%) | 19(51%) |
| Family                                 | 11(58%) | 11(85%) | 19(44%)  | 19(58%) | 16(33%) | 18(49%) |
| Training                               | 2(11%)  | 0 -     | 5(12%)   | 3(9%)   | 0 -     | 0 -     |
| Independent                            | 4(21%)  | 1(8%)   | 1(2%)    | 0 -     | 0 -     | 0 -     |
| <u>Daytime Activities<sup>c</sup></u>  |         |         |          |         |         |         |
| <u>Scale Score</u>                     |         |         |          |         |         |         |
| Mean                                   | 5.9     | 6.5     | 4.2      | 4.4     | 3.4     | 3.2     |
| SD                                     | 1.8     | 1.2     | 2.0      | 1.9     | 0.9     | 0.8     |
| N                                      | 18      | 11      | 43       | 33      | 48      | 37      |
| <u>Distribution</u>                    |         |         |          |         |         |         |
| No Formal Program                      | 1(6%)   | 0 -     | 4(9%)    | 2(6%)   | 0 -     | 0 -     |
| Day Care                               | 0 -     | 0 -     | 1(2%)    | 1(3%)   | 0 -     | 0 -     |
| DAC/WAC                                | 1(6%)   | 1(8%)   | 15(35%)  | 10(30%) | 37(77%) | 33(87%) |
| Sheltered Wksp                         | 3(17%)  | 0 -     | 10(23%)  | 9(27%)  | 7(14%)  | 2(5%)   |
| Supported                              |         |         |          |         |         |         |
| Employment                             | 1(6%)   | 1(8%)   | 1(2%)    | 1(3%)   | 3(6%)   | 1(4%)   |
| Competitive                            |         |         |          |         |         |         |
| Employment                             | 12(67%) | 10(83%) | 12(28%)  | 10(30%) | 1(2%)   | 1(4%)   |

\* Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Employment variables are defined as follows: Competitive = competitive or supervised/ supported employment; Sheltered = sheltered workshop or DAC/(Day Activity Center) or WAC (Work Activity Center); Not Employed = unemployed and looking for work or unemployed and not looking for work.

<sup>c</sup> Information on income per month is only for those subjects who were employed.

<sup>d</sup> Information on SSI and Disability income per month is based on all subjects for whom information was available.

Table 2-8

## FRIENDSHIPS AND RECREATION/LEISURE ACTIVITIES

|                                      | Mild    |        |         | Moderate |         |         | Severe  |         |         |
|--------------------------------------|---------|--------|---------|----------|---------|---------|---------|---------|---------|
|                                      | Dist A  | Dist B | Total   | Dist B   | Dist C  | Total   | Dist B  | Dist C  | Total   |
| <u>Friendships<sup>a</sup></u>       |         |        |         |          |         |         |         |         |         |
| <u>Number</u>                        |         |        |         |          |         |         |         |         |         |
| Mean                                 | 3.2     | 3.0    | 3.1     | 2.4      | 3.0     | 2.8     | 1.7     | 2.3     | 2.1     |
| SD                                   | 4.2     | 2.3    | 3.8     | 2.9      | 3.2     | 3.1     | 2.1     | 3.4     | 3.0     |
| N                                    | 26      | 8      | 34      | 28       | 50      | 78      | 29      | 55      | 84      |
| <u>Variety<sup>b</sup></u>           |         |        |         |          |         |         |         |         |         |
| Mean                                 | 1.0     | 2.8    | 1.6     | 2.2      | 3.2     | 2.8     | 2.3     | 2.3     | 2.3     |
| SD                                   | 1.6     | 2.2    | 1.9     | 1.6      | 1.6     | 1.6     | 2.2     | 1.9     | 2.0     |
| N                                    | 8       | 4      | 12      | 28       | 48      | 76      | 29      | 53      | 82      |
| <u>Recreation/Leisure Activities</u> |         |        |         |          |         |         |         |         |         |
| <u>Scaled Score<sup>c</sup></u>      |         |        |         |          |         |         |         |         |         |
| Mean                                 | 6.0     | 9.2    | 6.8     | 7.6      | 7.5     | 7.5     | 7.5     | 7.1     | 7.2     |
| SD                                   | 1.6     | 2.2    | 2.2     | 2.0      | 2.6     | 2.4     | 1.8     | 2.6     | 2.4     |
| N                                    | 26      | 8      | 34      | 28       | 49      | 77      | 30      | 56      | 86      |
| <u>Sample Activities</u>             |         |        |         |          |         |         |         |         |         |
| Shopping                             | 17(65%) | 6(75%) | 23(68%) | 24(86%)  | 43(88%) | 67(87%) | 20(67%) | 39(70%) | 59(69%) |
| Sports (Do)                          | 8(31%)  | 5(63%) | 13(38%) | 8(28%)   | 16(33%) | 24(31%) | 12(40%) | 25(45%) | 37(43%) |
| Sports (See)                         | 3(12%)  | 3(38%) | 6(18%)  | 2(7%)    | 7(14%)  | 9(12%)  | 3(10%)  | 7(13%)  | 10(12%) |
| Movie                                | 6(23%)  | 4(50%) | 10(29%) | 8(28%)   | 23(47%) | 31(40%) | 11(37%) | 20(41%) | 31(36%) |
| Party/Dance                          | 6(23%)  | 4(50%) | 10(29%) | 7(25%)   | 19(39%) | 26(34%) | 10(33%) | 24(43%) | 34(40%) |
| Visit Friend                         | 16(62%) | 6(75%) | 22(65%) | 14(50%)  | 33(67%) | 47(61%) | 19(63%) | 24(43%) | 33(59%) |
| Club Meeting                         | 2(8%)   | 2(25%) | 4(12%)  | 9(32%)   | 8(16%)  | 17(22%) | 9(30%)  | 9(16%)  | 18(21%) |
| Religious                            | 7(27%)  | 4(50%) | 11(32%) | 16(57%)  | 20(41%) | 36(47%) | 8(27%)  | 21(38%) | 29(34%) |
| Eat Out                              | 15(58%) | 7(88%) | 22(65%) | 21(75%)  | 33(67%) | 54(70%) | 15(50%) | 43(77%) | 58(67%) |
| Walking                              | 9(35%)  | 6(75%) | 15(44%) | 21(75%)  | 35(71%) | 56(73%) | 22(73%) | 37(66%) | 59(69%) |

<sup>a</sup> Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Variety of Friends was an additive scale involving has special friends, peer friend, residence staff friend, teacher/boss friend, other friends, romantic friend, regular contact with same age persons without handicap, visited friend, and attended party or dance.

<sup>c</sup> Recreation/Leisure Activities was an additive scale involving the 10 activities under Sample Activities in this table.

distributions for individual activities: Shopping,  $\chi^2(2) = 8.89$ ,  $p < .05$ ; Visits friend,  $\chi^2(2) = 11.11$ ,  $p < .01$ ; Walking,  $\chi^2(2) = 9.07$ ,  $p < .05$ .

Comparisons of districts showed similarities for the former students with moderate mental retardation and the former students with severe mental retardation. For former students with mild retardation, greater participation by District B individuals was indicated for several of the 10 activities.

Friendships and recreation/leisure data for males and females are shown in Table 2-9. Minimal differences were indicated between males and females across variables and levels of mental retardation. No statistically significant differences were found for any of the scaled scores. Differences were found in the distributions for three of the activities: Sports (Do),  $\chi^2(1) = 6.73$ ,  $p < .01$ ; Sports (See),  $\chi^2(1) = 6.11$ ,  $p < .05$ ; Visits friend,  $\chi^2(1) = 4.96$ ,  $p < .05$ .

### Living Skills

Table 2-10 provides information on several living skills variables. On average, there were few differences between young adults with mild and moderate levels of mental retardation for "shops for self" and "has savings account." For the remaining variables, greater differences were evident between these two groups. In general, young adults with severe mental retardation had percentages on these items that were considerably lower than both the young adults with mild mental retardation and the young adults with moderate mental retardation. Chi-square analyses revealed significant effects for level of mental retardation for five of the variables: Shops for self,  $\chi^2(2) = 14.74$ ,  $p < .001$ ; Pays for self,  $\chi^2(2) = 33.98$ ,  $p < .001$ ; Uses savings account,  $\chi^2(2) = 33.98$ ,  $p < .001$ ; Has checking account,  $\chi^2(2) = 7.78$ ,  $p < .05$ .

Living skills information for males and females is presented in Table 2-11. Within each level of mental retardation, few differences existed between males and females. No statistically significant differences were found between males and females for any of the variables in Table 2-11.

Table 2-9

## FRIENDSHIPS AND RECREATION/LEISURE ACTIVITIES FOR MALES AND FEMALES\*

|                                      | Mild    |         | Moderate |         | Severe  |         |
|--------------------------------------|---------|---------|----------|---------|---------|---------|
|                                      | Male    | Female  | Male     | Female  | Male    | Female  |
| <u>Friendships</u>                   |         |         |          |         |         |         |
| <u>Number</u>                        |         |         |          |         |         |         |
| Mean                                 | 3.6     | 2.5     | 2.4      | 3.3     | 2.5     | 1.6     |
| SD                                   | 4.4     | 2.7     | 3.4      | 2.6     | 3.4     | 2.4     |
| N                                    | 21      | 12      | 44       | 34      | 47      | 37      |
| <u>Variety<sup>b</sup></u>           |         |         |          |         |         |         |
| Mean                                 | 1.1     | 3.0     | 2.6      | 3.2     | 2.2     | 2.3     |
| SD                                   | 1.5     | 2.6     | 1.5      | 1.6     | 2.1     | 1.8     |
| N                                    | 9       | 3       | 43       | 33      | 45      | 37      |
| <u>Recreation/Leisure Activities</u> |         |         |          |         |         |         |
| <u>Scaled Score<sup>c</sup></u>      |         |         |          |         |         |         |
| Mean                                 | 6.8     | 6.8     | 7.4      | 7.6     | 7.4     | 7.1     |
| SD                                   | 2.3     | 2.0     | 2.4      | 2.5     | 2.4     | 2.3     |
| N                                    | 21      | 12      | 43       | 34      | 48      | 38      |
| <u>Sample Activities</u>             |         |         |          |         |         |         |
| Shopping                             | 14(67%) | 9(69%)  | 38(86%)  | 29(85%) | 32(67%) | 27(71%) |
| Sports (Do)                          | 9(43%)  | 4(31%)  | 15(34%)  | 9(26%)  | 27(56%) | 10(26%) |
| Sports (See)                         | 5(24%)  | 1(8%)   | 6(14%)   | 3(9%)   | 9(19%)  | 1(3%)   |
| Movie                                | 7(33%)  | 3(23%)  | 19(43%)  | 12(35%) | 19(40%) | 12(32%) |
| Party/Dance                          | 7(33%)  | 3(23%)  | 12(27%)  | 14(41%) | 18(38%) | 16(42%) |
| Visit Friend                         | 11(52%) | 11(85%) | 24(54%)  | 23(68%) | 15(31%) | 18(47%) |
| Club Meeting                         | 2(10%)  | 2(15%)  | 9(20%)   | 8(24%)  | 9(19%)  | 9(24%)  |
| Religious                            | 6(28%)  | 5(38%)  | 17(39%)  | 19(56%) | 17(35%) | 12(32%) |
| Eat Out                              | 12(57%) | 10(77%) | 28(64%)  | 26(76%) | 34(71%) | 24(63%) |
| Walking                              | 11(52%) | 4(31%)  | 33(75%)  | 23(68%) | 33(69%) | 26(68%) |

\* Variations in Ns for different variables are due to data not fitting into examined categories or to missing data.

<sup>b</sup> Variety of Friends was an additive scale involving has special friends, peer friend, residence staff friend, teacher/boss friend, other friends, romantic friend, regular contact with same age person without handicap, visited friend, and attended party or dance.

<sup>c</sup> Recreation/Leisure Activities was an additive scale involving the 10 activities under Sample Activities in this table.

Table 2-10

## LIVING SKILLS INFORMATION

|                      | Mild    |         |         | Moderate |         |         | Severe  |         |         |
|----------------------|---------|---------|---------|----------|---------|---------|---------|---------|---------|
|                      | Dist A  | Dist B  | Total   | Dist B   | Dist C  | Total   | Dist B  | Dist C  | Total   |
| <u>Shopping</u>      |         |         |         |          |         |         |         |         |         |
| Shops for self       | 25(96%) | 8(100%) | 33(97%) | 25(89%)  | 45(90%) | 70(90%) | 27(40%) | 35(62%) | 62(72%) |
| Pays for self        | 22(88%) | 5(63%)  | 27(79%) | 11(39%)  | 30(67%) | 41(52%) | 7(23%)  | 9(26%)  | 16(19%) |
| <u>Banking</u>       |         |         |         |          |         |         |         |         |         |
| Has savings account  | 17(65%) | 4(50%)  | 21(62%) | 11(39%)  | 35(70%) | 46(60%) | 15(50%) | 23(41%) | 38(44%) |
| Uses savings account | 13(76%) | 2(50%)  | 15(44%) | 1(9%)    | 11(31%) | 12(26%) | 0 -     | 2(9%)   | 2(5%)   |
| Has checking account | 9(35%)  | 2(25%)  | 11(32%) | 1(4%)    | 10(20%) | 11(14%) | 5(17%)  | 6(11%)  | 11(13%) |
| <u>Telephone</u>     |         |         |         |          |         |         |         |         |         |
| Dials to call        | 25(96%) | 8(100%) | 33(97%) | 24(86%)  | 44(88%) | 68(87%) | 6(20%)  | 14(25%) | 20(23%) |

Table 2-11

## LIVING SKILLS INFORMATION FOR MALES AND FEMALES

|                      | Mild    |          | Moderate |         | Severe  |         |
|----------------------|---------|----------|----------|---------|---------|---------|
|                      | Male    | Female   | Male     | Female  | Male    | Female  |
| <u>Shopping</u>      |         |          |          |         |         |         |
| Shops for self       | 20(95%) | 13(100%) | 40(91%)  | 30(88%) | 36(75%) | 26(68%) |
| Pays for self        | 18(86%) | 9(69%)   | 24(54%)  | 17(50%) | 11(23%) | 5(13%)  |
| <u>Banking</u>       |         |          |          |         |         |         |
| Has savings account  | 12(57%) | 9(69%)   | 26(59%)  | 20(59%) | 26(54%) | 12(32%) |
| Uses savings account | 9(75%)  | 6(67%)   | 3(31%)   | 4(20%)  | 1(4%)   | 1(8%)   |
| Has checking account | 7(33%)  | 4(31%)   | 6(14%)   | 5(15%)  | 6(12%)  | 5(13%)  |
| <u>Telephone</u>     |         |          |          |         |         |         |
| Dials to call        | 20(95%) | 13(100%) | 38(86%)  | 30(88%) | 12(25%) | 8(21%)  |

## CHAPTER 3

### Using Economic Analysis to Estimate the Relative Efficiency of Alternative Special Education Services

Darrell R. Lewis, Robert H. Bruininks, and Martha L. Thurlow

Costs and outcomes data from the two special education programs serving students with severe mental retardation (see Chapter 2) were used to address efficiency considerations related to delivering special education services to these individuals. Two techniques were applied to assess the efficiency of special education: (1) effectiveness-cost analysis, involving comparisons based on costs per unit of outcomes, with outcomes expressed in common units of measurement (not necessarily monetary) and compared across programs, and (2) benefit-cost analysis, involving costs and outcomes expressed in monetary terms in comparison to a counterfactual group for determining net benefits.

The need for special education is well established in the literature based upon concerns regarding the importance of providing children and youth with handicapping conditions access to social and learning opportunities similar to those afforded their cohorts without handicaps. Most analyses on the merits of special education services have thus focused upon issues of access, equal opportunity, features of program models, and evaluation of program effects. On the other hand, the efficiency and productivity of special education services has received only minimal attention by policy makers, researchers or practitioners. Although some recent attention has been directed at examining the costs of special education (see, for example, the review on this issue in Lewis, Bruininks, & Thurlow, 1987), little attention has been given to linking these costs with outcomes. To date, only one other study (Lewis, Bruininks, Thurlow, & McGrew, 1988b) has attempted to systematically examine aspects of school-based special education services from a program efficiency perspective.

During the past decade there has been a growing number of benefit-cost applications to post-school employment training alternatives for young adults with developmental disabilities. Recent reviews of these efforts are provided by Noble and Conley (1987) and Rhodes, Ramsing, and Hill (1987). Especially noteworthy has been the work by Cronin and Cuvo (1979), Hill, Hill, Wehman, and Banks (1985), Hill and Wehman (1983), Hill, Wehman, Kregel, Banks, and Metzler (1987), Kerachsky, Thornton, Bloomenthal, Maynard, and Stephans (1985), Lam (1986), Rhodes (1982), and Schneider, Rusch, Henderson, and Geske (1982). Successful applications of benefit-cost analysis to other educational and social service programs also can be found in the broader literature (see, for example, Kemper, Long, & Thornton, 1981; Weber, Foster, & Weikert, 1978; Weisbrod, 1981). Many of these sources provide excellent discussions of the conceptual and technical features of benefit-cost analysis.

#### Issues in the Use of Economic Analysis Within Special Education

The evaluation of special education services for children and youth with handicaps is admittedly complex and should focus upon the broadest form of analysis. Nevertheless,

one useful, but by no means complete, strategy of special education evaluation involves the development of program outcome information in economic terms and more systematic cost-effectiveness and cost-benefit assessments.

The basic question being addressed in this chapter is whether formal benefit-cost and effectiveness-cost analyses might allow us to determine whether the outcomes of particular special education services for school-age children and youth are worth their resource costs. In attempting to answer this economic question our focus is upon measuring as many of the costs and outcomes as possible in monetary terms and in illustrating the relevance and value of these evaluation techniques to the field of special education.

Since benefit-cost analysis attempts to assess all effects and alternatives in terms of monetary cost and benefit values, pecuniary measurement becomes an obvious and very challenging hurdle. This issue has been particularly acute in the field of special education where traditionally most benefits have been assumed to be based upon achieving important social and educational values and, therefore, largely unmeasurable in monetary or economic terms. This is undoubtedly why evaluators of special education services rarely attempt this technique. A useful alternative to formal benefit-cost analysis can be the use of effectiveness-cost techniques wherein outcomes need not be expressed solely in monetary terms.

The application of benefit-cost analysis within educational programs has also generated concern about a number of critical assumptions, including those related to the use of discount rates, length or period(s) of time for estimating benefit streams, and, most critically, the alternative or counterfactual comparison group(s) against which the treatment or program is being compared. In every formal study that employs this form of analysis, critical assumptions need to be made about these matters. The assumptions can and often do lead to inconsistent or varying results.

The most serious design problem for both effectiveness-cost and benefit-cost analyses arises in developing an alternative for comparing the costs and outcomes resulting from current special education services. In the field of special education, for example, how does one design a comparison group to special education when both statutory law and social values preclude withholding such services for controlled experimental treatment? In reality, in most special education situations only one program is in place with no observable alternatives available for comparison purposes. If two or more different programs are in place and available to serve a similar population, then benefit-cost and effectiveness-cost comparisons could be made across the two program groups for assessing their relative efficiency. On the other hand, if one wants to assess the economic efficiency to society of a particular program in special education and such controlled design alternatives are indeed precluded, it is necessary to employ a post-hoc non-experimental comparison design with hypothetical rather than actual treatment alternatives. This latter approach obviously poses difficulties for structuring any study of costs and outcomes, and limits to some extent the conclusions that can be drawn from the analysis. Despite such limitations, the use of effectiveness-cost and benefit-cost paradigms still can yield a number of useful results in program evaluation for researchers, administrators and policy makers.

For purposes of illustrating some of these problematic issues and examining prospective uses of these evaluation techniques in special education, this paper has adapted some preliminary empirical data on the costs and outcomes resulting from two school-based special education programs for samples of youth with severe levels of mental retardation. Specifically, this chapter (a) identifies a conceptual framework developed in previous work by the authors (Lewis, Bruininks, Thurlow, & McGrew, 1988b) wherein special education costs and benefits can be comprehensively described, valued, and linked for analytic purposes, (b) presents some benchmark empirical data on economic costs and benefits for two specialized schools serving youth with severe mental retardation, (c) examines a number of alternative effectiveness-cost and benefit-cost assumptions for illustrating some of the problematic issues in the use of such procedures, and (d) provides some discussion of the value of these types of analyses for improving special education services.

### Method

#### Case Study Samples

The data employed for the illustrations in this paper are drawn from a larger study dealing with the costs and follow-up results on students with moderate and severe mental retardation formally enrolled in special education programs in specialized public schools (Bruininks, Lewis, Steffens, & Thurlow, 1989). The larger study assessed the outcomes of all students from one to ten years after they graduated or completed educational programs in two special schools for students with mental retardation. Both schools, which were located in a metropolitan area of the Midwest, had sole occupancy of older, former elementary school buildings, students with similar ability levels and demographics, and similar educational programs. One school served only students from a large urban school district. The other school was within an intermediate school district serving students from across nine suburban districts in the region.

The urban school was a separate facility and segregated school that served 142 students in 1983-84 and included all of the district's students with moderate to severe disabilities. Fifty-six percent of the students in this school were identified as having severe mental retardation with Stanford-Binet intelligence scores between 20 and 35, while 44% of the students were identified as moderately disabled with Stanford-Binet intelligence scores between 36 and 51. Although during each day some of these students were transported to other school buildings and community settings for selected training activities in the district, none of these students was mainstreamed within regular classrooms in 1984-85. Instructional programs focused on skills needed for transition into the community with emphasis given to apartment training, daily living, and vocational training.

The regional school was also a separate facility with a largely segregated program that in 1983-84 served 236 students ranging in age from 13 to 21 years. Students in this school had profiles of disabilities similar to those in the urban school. During each day a small number of students (on average 4%) was transported to an area vocational-technical

institute for an average of three instructional hours per day in vocational education. Others occasionally left the school as a group for field trips and some community employment training. Approximately one-third of all students were in a vocational unit with emphasis on developing skills for employment, recreation, and independent living. Other students were in a general unit and did not receive vocational training. Still other students were in a developmental unit that emphasized self-care and leisure activity skills.

Drawing from data collected in the larger study, certain special education costs and benefits were identified and valued for samples of former students from these two schools. School record information was obtained from students' cumulative files and from special education files. Follow-up outcome data on former students were obtained through detailed structured interviews and questionnaires principally with parents or other primary care providers. For the present analyses, a subset of the students from the larger study was selected. The subset consisted of students who had been out of school from one to five years and who were classified as having a severe level of mental retardation. This subset was selected because it represented consistent data sets from the two settings.

Summary descriptive data for the two schools, School A and School B, are presented in Table 3-1. [The labels "School A" and "School B" have been arbitrarily assigned to the results. Both school programs have undergone significant restructuring since the students in our samples were in school. We hope to preserve the anonymity of the participating schools so that they are not connected with the outcomes for programs that no longer exist.]

The follow-up response rate with complete outcome information for School A was 91% of all students with severe retardation and totaled 30 young adults with 50% males and 50% females. At School B the response rate was 71%, with 56 young adults in the final sample of respondents (59% males and 41% females). Additional details relative to sample characteristics, statistical tests, and follow-up results are reported in Chapter 2. All students in the samples were full time within their respective day schools and were provided hourly special education services that averaged almost seven hours per day over their 12 plus years of schooling.

The respondents from School A reported only 7% in competitive paid employment, with another 33% in sheltered work settings, and 60% unemployed. Their average annual earned income for all respondents was \$432 in 1984 current dollars and average annual transfer payments in cash (supplemental security income, medicaid assistance, and other nonearned income) totaled \$2,778. Although none of the respondents was reported as institutionalized, 70% were living within a group or foster home. The remaining respondents were living with their families (30%).

Although only 7% of the School B sample reported competitive employment, 66% were receiving paid employment within a sheltered setting. The average annual earned income for all respondents was \$516 in 1984 current dollars and average annual cash transfer payments for all respondents were estimated to total \$3,252. Although none of the respondents lived independently, they all lived within the metropolitan area. None of the respondents from School B was institutionalized, with almost one-half of the sample living

Table 3-1

**SUMMARY OF SAMPLE CHARACTERISTICS AND ONE TO FIVE YEAR POST SCHOOL  
FOLLOW-UP DATA FOR SAMPLES OF STUDENTS WITH SEVERE MENTAL RETARDATION**

|                                                     | School A | School B | Schools A&B<br>Combined |
|-----------------------------------------------------|----------|----------|-------------------------|
| <b>I. Sample Information</b>                        |          |          |                         |
| Total School Completers                             | 33       | 79       | 112                     |
| Number of Respondents                               | 30       | 56       | 86                      |
| Response Rate of Sample                             | 91%      | 71%      | 77%                     |
| Males                                               | 50%      | 59%      | 56%                     |
| Females                                             | 50%      | 41%      | 44%                     |
| <b>II. Follow-Up Post School Information</b>        |          |          |                         |
| <u>Employment Status:</u>                           |          |          |                         |
| Competitive Paid Employment                         | 7%       | 7%       | 7%                      |
| Sheltered Paid Employment                           | 33%      | 66%      | 54%                     |
| Unemployed                                          | 60%      | 27%      | 39%                     |
| <u>Income/Job Characteristics:</u>                  |          |          |                         |
| Average Earned Income Per Month                     | \$36     | \$43     | \$40                    |
| Average Earned Income Per Year                      | \$432    | \$516    | \$480                   |
| Average Hours Worked Per Week For Those<br>Employed | 13       | 20       | 18                      |
| <u>Financial Independence:</u>                      |          |          |                         |
| Respondents Receiving SSI                           | 83%      | 93%      | 88%                     |
| Respondents Receiving Medicaid                      | 93%      | 85%      | 88%                     |
| Respondents with Checking Accounts                  | 17%      | 11%      | 13%                     |
| Average SSI/Disability Per Year                     | \$1,537  | \$1,992  | \$1,749                 |
| Average Other Nonearned Income Per Year             | \$1,241  | \$1,260  | \$1,248                 |
| <u>Community Adjustment:</u>                        |          |          |                         |
| Average Total ICAP (in W units) Score               | 469      | 452      | 456                     |
| Standard Deviation                                  | 17.6     | 33.6     | 29.4                    |
| Average Daytime Activity Scale (DAS)                | 3.1      | 3.4      | 3.3                     |
| Average Living Arrangement Scale (LAS)              | 2.3      | 2.5      | 2.4                     |
| Institution                                         | 0%       | 0%       | 0%                      |
| Group or Foster Home                                | 70%      | 55%      | 61%                     |
| With Family                                         | 30%      | 45%      | 39%                     |
| Independent (or with spouse/friends)                | 0%       | 0%       | 0%                      |

**SOURCE:** All data are adapted from Chapter 2. All averages are reported for each total sample of respondents, except for hours worked per week.

with family members (45%), while the remaining 55% were living within a supervised group or foster home.

### Modeling the Efficiency Assessment of Special Education

The efficiency of special education can be assessed in at least two ways. The first is through the use of effectiveness-cost techniques wherein comparisons are based on costs per unit of outcomes and outcomes are expressed in common (but not necessarily monetary) units of measurement and compared in two or more similar programs. The second method is to use standard benefit-cost techniques with both costs and outcomes expressed in monetary terms in comparison to a counterfactual group for determining net benefits. Both of these techniques are described and applied to the data used in this chapter.

Use of either an effectiveness-cost or benefit-cost evaluation framework to evaluate programs requires several important steps. First, the program being evaluated needs to be identified along with its alternative comparison(s). Second, an appropriate accounting framework must be developed for identifying all costs and possible benefits. Third, the costs and benefits need to be measured and valued. Finally, the analyst needs to examine a number of alternative assumptions in the accounting framework to test for their likely effects on the results.

### Measurement of Benefits

Two primary categories of benefits were used in this study (i.e., earnings and adaptive behavior measures). First, earnings (hourly, monthly, and annual) data were derived from a lengthy interview study of key informants, generally parents or primary care providers who possessed information on the current financial status of sample members (see Chapter 2). Second, measures to estimate extent of personal independence skills and level of integration into community living and day placements were derived from a nationally standardized adaptive behavior measure and a simple scaling of residential and day program placements.

The assessment of adaptive behavior used the Inventory of Client and Agency Planning (ICAP) instrument developed by Bruininks, Hill, Weatherman, and Woodcock (1986). The ICAP assesses diagnostic and health status, adaptive behavior, problem behavior, services received and projected service needs, and family, leisure, and social activities. The adaptive behavior measure contains items in four domains (motor skills, social and communication skills, personal living skills, and community living skills). The total Broad Independence Score from this instrument was used in these analyses. The ICAP was standardized on a national sample from birth to adult levels and included extensive technical studies on persons with disabilities (see Chapter 2).

Two continuum scales were developed from information provided by the ICAP and the interview. First, a Day Activity Scale (DAS) was developed from information provided in the interview. This simple scale assessed the extent to which the sample members participated in day placements or work without supervision, ranging from total supervision

without a formal program to competitive employment (1 = no formal program outside home, 2 = day care, 3 = day/work activity center, 4 = sheltered workshop, 5 = school or volunteer, 6 = supervised/supported employment, and 7 = competitive employment). Second, a Living Arrangements Scale (LAS) was developed from information provided on the ICAP. This scale assessed the independence of living arrangements, ranging from institutionalized to independent (1 = institution, hospital, or nursing home), 2 = group residence, 3 = living with family or relatives, 4 = apartment training or half-way house, 5 = living independently or with friends or spouse). These scales are described further in Bruininks, McGrew, Thurlow, and Lewis (1988).

### Measurement of Special Education Costs

A comprehensive resource components approach for identifying, measuring, and valuing the costs of special education services was used in this study. Estimates for all school-based costs in the special schools were taken from earlier cost studies in the same schools by Lewis, Bruininks, and Thurlow (1988b, 1988c) and expressed in 1984 present values. Cost estimates were based on all of the resources employed in the delivery of special education services for the samples under study. The special education service costs were representative of other metropolitan school district costs (Lewis et al., 1987) and consistent with similar cost data reported by other studies (Kakalik, Furry, Thomas, & Carney, 1981; Raphael, Singer, & Walker, 1985).

## Results

### Effectiveness-Cost Analysis

In the use of effectiveness-cost analysis, the costs and outcomes of alternative programs with similar goals are taken into account in the assessment of their relative efficiency. In the use of this technique it is assumed that only programs with similar goals can be compared and that a common measure of effectiveness can be used to assess them. This common measure of outcome data then can be combined with costs in order to provide an effectiveness-cost ratio that will enable the analyst to judge which of the alternatives provides the maximum outcome per level of cost or which program requires the least cost per level of effectiveness.

This technique is illustrated in Table 3-2 where our concern is with assessing the relative efficiency of special education for students with severe mental retardation between the programs at the two specialized schools identified as School A and School B. The costs per hour of instruction in the two schools are taken from data in the larger study (Lewis et al., 1988b, 1988c) and represent actual average hourly costs of special education for these same respondents within the two specialized schools. The average ICAP scores expressed in standardized W-scale units (Bruininks et al., 1986) report on measured adaptive behavior, while the average DAS scores report on the extent of integration, for the samples in this study. These scores, along with average monthly earnings, also are adapted from the larger study (see Chapter 2). It is important to note that both the ICAP and DAS scores, which represent estimates of social and community adjustment, were

Table 3-2

**THE RELATIVE EFFICIENCY OF ALTERNATIVE SPECIAL EDUCATION PROGRAMS  
FOR STUDENTS WITH MODERATE AND SEVERE MENTAL RETARDATION**

|  | Number<br>in<br>Sample<br>(1) | Average<br>Cost/Hour<br>Per Pupil<br>(2) | Average<br>ICAP<br>Score<br>(3) | Average<br>DAS<br>Score<br>(4) | Average<br>Monthly<br>Earnings<br>(5) | ICAP<br>E/C<br>Ratio<br>(6) | DAS<br>E/C<br>Ratio<br>(7) | Earnings<br>B/C<br>Ratio<br>(8) |
|--|-------------------------------|------------------------------------------|---------------------------------|--------------------------------|---------------------------------------|-----------------------------|----------------------------|---------------------------------|
|--|-------------------------------|------------------------------------------|---------------------------------|--------------------------------|---------------------------------------|-----------------------------|----------------------------|---------------------------------|

Effects Resulting from Alternative Programs for Students with Severe Mental Retardation One to Five Years Out of School.

|          |    |      |     |     |      |      |     |     |
|----------|----|------|-----|-----|------|------|-----|-----|
| School A | 30 | \$12 | 464 | 3.2 | \$36 | 38.7 | .27 | 3.0 |
| School B | 56 | \$9  | 452 | 3.4 | \$43 | 50.2 | .38 | 4.8 |

Effects Resulting from Alternative Programs for Students with Moderate Mental Retardation One to Five Years Out of School.

|          |    |      |     |     |       |      |     |      |
|----------|----|------|-----|-----|-------|------|-----|------|
| School A | 28 | \$12 | 486 | 3.1 | \$68  | 40.5 | .26 | 5.7  |
| School B | 50 | \$9  | 504 | 4.9 | \$207 | 56.0 | .54 | 23.0 |

- (1) Number of students in follow-up subsample one to five years post-school.
- (2) Educational costs per student per hour of respondents in subsample.
- (3) Average ICAP scores of respondents in subsample.
- (4) Average DAS scores of respondents in subsample.
- (5) Average monthly earnings of respondents in subsample.
- (6) Effectiveness/cost ratio of ICAP scores divided by hourly costs.
- (7) Effectiveness/cost ratio of DAS scores divided by hourly costs.
- (8) Benefit/cost ratio of monthly earnings divided by hourly costs.

**SOURCE:** All outcome data are adapted from Chapter 2. Costs for School A are from Lewis et al. (1988b); costs for School B are from Lewis et al (1988a).

collected as outcome measures during the post-school follow-up interviews from all respondents one to five years after leaving school. Obviously, these data on effectiveness would have had greater validity if they had been expressed in change scores, or longer term outcomes, based on pre-scores taken either early in the schooling process or, at the least, at the point of leaving school. Unfortunately, the larger study did not have access to such information and this weakness in the outcome measure in turn lessens the generalizability of these analyses. The data and analyses do, however, illustrate the utility of using such techniques for making judgments about efficiency.

Although students were not randomly assigned to the two different schools, descriptive information about the samples indicate that the two groups were approximately equal in abilities and characteristics. Both groups represented the entire population of students with severe levels of mental retardation in their respective communities, both groups had similar gender and age characteristics, and both groups had approximately the same standard deviations and ranges in ICAP scores (see Table 3-1 for illustration on these measures). The follow-up response rates of both samples were also very high.

In reviewing average ICAP scores in column 3 of Table 3-2 for our two samples of students with severe levels of mental retardation, we notice that they are approximately equal for the two schools. However, when costs are factored into an effectiveness-cost ratio, as in column 6, we notice that the effectiveness per dollar of instructional cost is almost 30% greater for School B. Similarly, when costs are related to average DAS scores as the outcome measure, as in column 7, we discover that the effectiveness-cost ratio is almost 50% greater at School B. Although not reported in Table 3-2, when costs are related to average LAS scores as the outcome measure, the effectiveness-cost ratio is also over 40% greater at School B. When costs are related to average monthly earnings the benefit-cost ratio (column 8) becomes over 60% greater at School B.

Even if the students with severe disabilities at the two schools had been dissimilar independent of program effects, it is still possible to make strong inferences about program and efficiency effects using these particular effectiveness-cost techniques. Intuitively, for example, one would expect that programs for students with moderate mental retardation would show better outcomes per unit of costs than results from alternative programs for students with more severe mental retardation. On the other hand, if the opposite should occur then added confidence can be placed on any earlier results that might have shown greater efficiency for the alternative program serving the students with more severe disabilities. Fortunately, data in the larger study permit just such an additional test of our results.

In the lower portion of Table 3-2, we have reported the same effectiveness-cost measures for another sample of students from the same two schools who were classified as moderately retarded. These data are also drawn from the larger study in Chapter 2. Note that when comparing the effectiveness-cost ratios (columns 6 and 7) of School B for students with severe mental retardation with those same ratios for students with moderate retardation at School A, in both cases they exceed those at Urban school (i.e.,  $50.2 > 40.5$  and  $.38 > .26$ ). Only in the case of earnings does the benefit-cost ratio (column 8) of

School A students with moderate retardation exceed the ratio of School B students with severe retardation (i.e.,  $5.7 > 4.8$ ).

From our review of these efficiency results, it seems reasonable to conclude that something unique was happening at School B that accounted for its greater efficiency in effecting post-school outcomes. These efficiency effects may have resulted from the unique quality of School B's more vocationally oriented and experientially-based curriculum and/or its more effective deployment of resources in support of this curriculum and its special education services. However, it is also possible that certain community contextual factors, such as greater family support in communities served by School B, influenced these longer term post-school results.

### Benefit-Cost Analysis

A conceptual framework for determining net monetary benefits from benefit and cost comparisons of special education for former students with severe levels of retardation can be constructed if it is assumed that appropriate costs and benefits can be measured and valued in monetary units for a similar or hypothetical sample that received either similar or no special education services. Such alternatives are illustrated and incorporated within the framework of Tables 3-3 to 3-5.

The benefit-cost accounting framework employed in this section draws heavily upon the framework outlined by Thornton and Will (1986) and adapted to special education by Lewis, Bruininks, Thurlow, and McGrew (1988b). This approach identifies the analytical perspectives of interest to both students and society. It is important to note that this model provides insight into not only those benefits and costs that can be monetized, but also into other effects that cannot be measured in dollars alone. It notes, for example, important other non-monetary benefits such as preferences for work and prospects for increased self-sufficiency, daytime activities, independent living, and social and community integration.

Table 3-3 best illustrates this accounting framework wherein the school-based special education program for individuals with severe retardation in School B is compared directly with the similar program at School A. The framework and analysis of Table 3-3 examines the same efficiency question addressed earlier with effectiveness-cost analysis, except in this case, we are employing more formal benefit-cost techniques and attempting to estimate net benefits.

A number of other alternative hypothetical comparison groups were constructed for purposes of illustrating the use of benefit-cost analysis in examining the economic worth question of special education for populations with severe retardation. These hypothetical comparison groups were constructed largely through developing historical data according to different assumptions. In the most extreme case, as illustrated in Table 3-4, one could assume that the "eugenics movement" during the early part of this century was successful in requiring life-time institutionalization for many individuals with severe mental retardation. As a second alternative, as illustrated in Table 3-5, one could assume that the high rate of institutionalization that prevailed during the 1960s still prevailed today. Differing costs and benefits would derive, of course, from each of these hypothetical alternatives.

Table 3-3

**BENEFITS AND COSTS OF SPECIAL EDUCATION  
FOR STUDENTS WITH MENTAL RETARDATION**

Comparison Group: Current School B Program Versus Current School A Program

| Impacts                                | Analytical Perspective |                  |                   |
|----------------------------------------|------------------------|------------------|-------------------|
|                                        | Social                 | Student          | + Other Taxpayers |
| <b>BENEFITS</b>                        |                        |                  |                   |
| 1) INCREASED OUTPUT                    |                        |                  |                   |
| Increased Earnings                     | \$1,074                | \$1,074          | 0                 |
| Increased Fringe Benefits              | \$161                  | \$161            | 0                 |
| Increased Taxes                        | 0                      | (\$43)           | \$43              |
| Work Preferences                       | +                      | +                | +                 |
| 2) REDUCED USE OF ALTERNATIVE PROGRAMS |                        |                  |                   |
| Community Residential Homes            | \$37,744               | (\$4,499)        | \$42,243          |
| 3) OTHER BENEFITS                      |                        |                  |                   |
| Increased Daytime Activity             | +                      | +                | +                 |
| Increased Independent Living           | +                      | +                | +                 |
| Improved Quality of Life               | +                      | +                | +                 |
| <b>TOTAL BENEFITS:</b>                 | <b>\$38,979</b>        | <b>(\$3,307)</b> | <b>\$42,286</b>   |
| <b>COSTS</b>                           |                        |                  |                   |
| 1) REDUCED PROGRAM COSTS               |                        |                  |                   |
| Special Education Cost Savings         | \$46,778               | 0                | \$46,778          |
| 2) INCREASED USE OF TRANSFER PROGRAMS  |                        |                  |                   |
| Increased SSI/Disability/Other         | 0                      | \$6,059          | (\$6,059)         |
| <b>TOTAL COSTS:</b>                    | <b>\$46,778</b>        | <b>\$6,059</b>   | <b>\$40,719</b>   |
| <b>NET BENEFITS:</b>                   | <b>\$85,757</b>        | <b>\$2,752</b>   | <b>\$83,005</b>   |

Notes. Adapted from Thornton and Will (1986). The individual components are characterized from the three perspectives as being a net benefit (+), a net cost (-), or neither (0). All data are reported in per student 1984 present values.

Table 3-4

**BENEFITS AND COSTS OF SPECIAL EDUCATION FOR INDIVIDUALS  
WITH SEVERE MENTAL RETARDATION ONE TO FIVE YEARS OUT OF SCHOOL**

Comparison Group: Current Programs in Schools A and B Combined Versus Hypothetical  
Condition of No Special Education with Life-Time Institutionalization

| Impacts                                                                     | Analytical Perspective                |            |             |
|-----------------------------------------------------------------------------|---------------------------------------|------------|-------------|
|                                                                             | Social = Individual + Other Taxpayers |            |             |
| BENEFITS                                                                    |                                       |            |             |
| 1) INCREASED OUTPUT                                                         |                                       |            |             |
| Increased Earnings                                                          | \$6,136                               | \$6,136    | 0           |
| Increased Fringe Benefits                                                   | \$920                                 | \$920      | 0           |
| Increased Taxes                                                             | 0                                     | (\$245)    | \$245       |
| Work Preferences                                                            | +                                     | +          | +           |
| 2) REDUCED USE OF ALTERNATIVE PROGRAMS                                      |                                       |            |             |
| Institutional Care Costs                                                    | \$619,716                             | (\$36,088) | \$655,804   |
| 3) OTHER BENEFITS                                                           |                                       |            |             |
| Increased Self-Sufficiency                                                  | +                                     | +          | +           |
| Increased Self-Esteem                                                       | +                                     | +          | +           |
| Improved Quality of Life                                                    | +                                     | +          | +           |
| TOTAL BENEFITS:                                                             | \$626,772                             | (\$29,277) | \$656,049   |
| COSTS                                                                       |                                       |            |             |
| 1) PROGRAM COSTS                                                            |                                       |            |             |
| Special Education Costs                                                     | (\$189,270)                           | 0          | (\$189,270) |
| 2) INCREASED USE OF SOCIAL SERVICES                                         |                                       |            |             |
| Community Residential Homes                                                 | (\$184,707)                           | \$22,014   | (\$206,721) |
| Job or Work Related Training                                                | -                                     | 0          | -           |
| Community Support Services                                                  | -                                     | 0          | -           |
| 3) INCREASED USE OF TRANSFER PAYMENTS                                       |                                       |            |             |
| Increased Income Support (SSDI/SSI)<br>and Medical Care (Medicaid/Medicare) | 0                                     | \$38,312   | (\$38,312)  |
| TOTAL COSTS:                                                                | (\$373,977)                           | \$60,326   | (\$434,303) |
| NET BENEFITS:                                                               | \$252,971                             | \$31,049   | \$221,746   |

Notes. Adapted from Thornton and Will (1986). The individual components are characterized from the three perspectives as being a net benefit (+), a net cost (-), or neither (0). All data are reported in per student 1984 present values and adapted from sources identified in Tables 3-1 and 3-6.

Table 3-5

**BENEFITS AND COSTS OF SPECIAL EDUCATION FOR INDIVIDUALS WITH  
SEVERE MENTAL RETARDATION ONE TO FIVE YEARS OUT OF SCHOOL**

Comparison Group: Current Programs in Schools A and B Combined Versus Hypothetical  
Condition of Institutionalization at 1965 Rate

| Impacts                                                                     | Analytical Perspective                |            |             |
|-----------------------------------------------------------------------------|---------------------------------------|------------|-------------|
|                                                                             | Social = Individual + Other Taxpayers |            |             |
| BENEFITS                                                                    |                                       |            |             |
| 1) INCREASED OUTPUT                                                         |                                       |            |             |
| Increased Earnings                                                          | \$2,577                               | \$2,577    | 0           |
| Increased Fringe Benefits                                                   | \$386                                 | \$386      | 0           |
| Increased Taxes                                                             | 0                                     | (\$103)    | \$103       |
| Work Preferences                                                            | +                                     | +          | +           |
| 2) REDUCED USE OF ALTERNATIVE PROGRAMS                                      |                                       |            |             |
| Institutional Care Costs                                                    | \$260,281                             | (\$15,157) | \$275,438   |
| 3) OTHER BENEFITS                                                           |                                       |            |             |
| Increased Self-Sufficiency                                                  | +                                     | +          | +           |
| Increased Self-Esteem                                                       | +                                     | +          | +           |
| Improved Quality of Life                                                    | +                                     | +          | +           |
| TOTAL BENEFITS:                                                             | \$263,244                             | (\$12,297) | \$275,541   |
| COSTS                                                                       |                                       |            |             |
| 1) PROGRAM COSTS                                                            |                                       |            |             |
| Special Education Costs                                                     | (\$189,270)                           | 0          | (\$189,270) |
| 2) INCREASED USE OF SOCIAL SERVICES                                         |                                       |            |             |
| Community Residential Homes                                                 | (\$77,577)                            | \$9,246    | (\$86,823)  |
| Job or Work Related Training                                                | -                                     | 0          | -           |
| Community Support Services                                                  | -                                     | 0          | -           |
| 3) INCREASED USE OF TRANSFER PAYMENTS                                       |                                       |            |             |
| Increased Income Support (SSDI/SSI)<br>and Medical Care (Medicaid/Medicare) | 0                                     | \$16,091   | (\$16,091)  |
| TOTAL COSTS:                                                                | (\$266,847)                           | \$25,337   | (\$292,184) |
| NET BENEFITS:                                                               | (\$3,603)                             | \$13,040   | (\$16,643)  |

Notes. Adapted from Thornton and Will (1986). The individual components are characterized from the three perspectives as being a net benefit (+), a net cost (-), or neither (0). All data are reported in per student 1984 present value and adapted from sources identified in Tables 3-1 and 3-6.

Other comparison groups and hypothetical alternatives could also have been developed and illustrated, but the three presented in this paper were selected because they most vividly illustrate both the critical nature of our assumptions and the potential value of using benefit-cost techniques to evaluate special education.

### School B Compared With School A

Table 3-3 compares the costs and benefits of special education from School B directly with those at School A. As in our effectiveness-cost analysis, we are attempting to measure the relative efficiency of the two programs with similar goals. In this illustration we are again focusing on the two samples that are summarized in Table 3-1.

With respect to the estimated impact on benefits, increased earnings represent the difference in average annual earnings between the two samples. When extrapolated over a work-life of 25 years and discounted into present value at 6%, this net difference in earnings totals \$1,074. Increased fringe benefits represent increasing earnings multiplied by a factor of 15% (U.S. Department of Labor, 1980). Increased taxes represent increased earnings multiplied by a factor of 4% (Pechman, 1985). Work preferences are expressed as unmeasured but clearly represent a positive outcome of most individuals and public opinion. Reduced use of community residential homes represents the difference in use of residential facilities in the community as between respondents from the two schools (i.e., 70% versus 55%). When expressed in 1984 dollars these per capita costs were estimated to be \$22,030 (see Table 3-6 in this study and Greenberg, Lakin, Hill, Bruininks, & Hauber, 1985). Extrapolating the 15% reduced use of these facilities over 25 years and discounted into present values at 6%, these costs were estimated to total \$42,243. It is important to note that when individuals move out of residential facilities, the state (i.e., taxpayers) saves the money that would have been spent on that person; however, some of the costs of basic board and room must now be paid by someone else within the community, usually the individual or the family. These basic home care costs have been estimated to be \$2,346 per year (U.S. Department of Labor, 1980). When projected over a 25 year life-span and discounted into present value, these costs were estimated to total \$29,996 for each individual or family. Thus, a 15% taxpayer reduction in these costs in turn results in an increase of \$4,499 in costs to families. Other benefits are expressed as unmeasured in this monetary algorithm, but the ICAP and DAS results reported in Table 3-1 appear to favor School B and should be counted as net benefits (+) in this taxonomy.

Reduced program costs result from the findings (Lewis et al., 1988b, 1988c) that annual per student costs were, on average, \$2,773 less at School B than those same costs at School A. When this difference was compounded at 6% over 12 years of schooling, the present value of such costs was estimated to be \$46,778. Increased use of transfer programs represent the increased use of supplemental security income, disability insurance and medicaid assistance by respondents from School B. The annual difference in transfer payments between the two samples was \$474 (see Table 3-1) and when expressed in present value terms this difference was estimated to be \$6,059.

The results in Table 3-3 directly support those in Table 3-2 wherein it was estimated that School B was likely to be more efficient (cost-effective) than School A in the delivery of

Table 3-6

SOURCES AND ESTIMATES FOR COST AND BENEFIT DATA  
EMPLOYED IN TABLES 3-4 AND 3-5

**Earnings:** Earnings data were derived from interview information collected from the pooled sample of 86 public school completers with severe mental retardation at Schools A and B identified in Table 3-1. Average annual earned income for all respondents in the combined sample in 1986 was \$480 and average monthly salary was estimated to be \$40. When extrapolated over an expected future work-life of 25 years and discounted at 6%, per capita life-time earnings were estimated to be \$6,136 in 1984 present values for each respondent. Seven percent of all respondents in the pooled sample were receiving earnings under competitive paid employment within one to five years after leaving school. Forty-seven percent of all respondents in the combined sample were receiving earnings under sheltered paid employment. The results are generally consistent with similar post-school follow-up studies of young adults with mental retardation in other states. From U.S. Department of Labor (1979) national survey data, it was estimated that the earnings of all individuals with mental retardation in sheltered workshops in 1976 average \$47 per month and \$29 per month in work activity centers.

**Fringe Benefits:** The U.S. Department of Labor (1980) estimates that approximately 15% of gross wages for low wage earners are paid in fringe benefit compensation.

**Taxes:** Pechman (1985) estimates the tax rate for low wage earners to be less than 4% of gross income.

**Mortality:** Numerous studies have verified that individuals with mental retardation have a shorter life expectancy with the more severely retarded having significantly shorter life spans. Therefore, any extrapolations about future costs and benefits relative to this population must make appropriate adjustments for these circumstances. Forssman and Akesson (1970), for example, estimate that individuals with mild retardation suffer a mortality rate 1.7 times that of the general population. Balakrishnan and Wold (1976) estimate that persons with mental retardation at age 20 can expect to live only 38 more years (to age 58 on average) as compared to almost 52 more years for the regular population at the same age. Moreover, Miller and Eyman (1977) found that community based and institution based mortality rates were comparable if age, IQ, and ambulation were considered. Their study suggested that mortality reflects the health condition of individuals with retardation rather than placement per se. Consequently, similar mortality estimations can be employed for both populations.

**Institutional Care:** Average annual per capita costs of care in Minnesota state-operated residential facilities for people with mental retardation were reported as being \$44,986 in 1984 by Lakin, Hill, Street, and Bruininks (1986, p. 29). Braddock, Hemp, and Howes (1986) reported a similar national average of \$42,457 for 1984. These costs do not include capital costs of facilities and are thus underestimated. When these costs were projected over an expected life-span of 44 years and discounted at 6%, institutionalization care costs were estimated to be \$655,804 in 1984 present values.

It is important to note that when an institutionalization is prevented, the state saves the total amount that would have been spent on that person in the institution. However, the costs of board, room, and any other basic care must now be paid by someone else within the community, usually the person or their family.

Average annual costs in family home care for children were estimated to be \$2,346 in 1984 dollars by the U.S. Department of Commerce (1985), and when discounted over 44 years were estimated to be \$36,088 in present value. Although families with children with mental retardation may have additional costs because of behavioral and health problems, data indicate that such children come disproportionately from lower SES families and their costs for child care would accordingly be less. However, lacking other empirical cost data a reasonable assumption would be to assume the same costs as for children without disabilities. These costs are assumed to be reasonable shadow prices and costs for board, room, and other basic care for individuals living independently, either alone or with family, within the community.

The costs of care provided in state-operated residential facilities for people with mental retardation have increased dramatically since 1950, when the annual per capita cost of care for state-operated facility residents was about \$750. A number of factors have contributed to the increasing costs of residential care in such institutions. One factor has been the more severe disabilities shown by persons served in these facilities.

(Table 3-6 continued on next page)

For example, in 1940 about 65% of all residents of state-operated facilities for mentally retarded people had borderline, mild, or moderate retardation. By 1985, only 20% of all residents had such classifications. Associated with these changes has been increased intensity and specialization of professional staff and the relatively lower reliance on residents in operating and maintaining facilities. Other important contributions to increasing costs have come from legislative and judicial efforts to upgrade the quality of living and habilitation provided within such public institutions (Lakin, Hill, Street, & Bruininks, 1986).

Since the peak year of 1965, the national placement rate of persons with mental retardation in all state-operated residential facilities has decreased from 115.8 per 100,000 of the general population to 49.3 in 1984, or a decline of over 57% (Lakin, Hill, Street, & Bruininks, 1986).

The incidence of severe mental retardation in the western world has been estimated to be about .1% of the total population (Abramowicz & Richardson, 1975; Stein & Susser, 1975). Using 1965 population data (Bureau of the Census, 1988) it can be estimated that there were about 193,000 people in the United States with severe mental retardation in 1965. It has also been estimated that in 1965 there were 61,808 individuals with severe mental retardation in state institutions (Scheerenberger, 1965) and an additional 18,290 persons who were severely mentally retarded in other state and county mental hospitals and private facilities (Lakin, Hill, & Bruininks, 1985). Thus, it appears that at least 42% of all persons (i.e., approximately 80,000 individuals) with severe mental retardation in the United States were institutionalized in some form in 1965.

Community Residential Care: Sixty percent of the subjects in the sample were living within a group or foster home. Forty percent were living with their family and none were living within an institution or independently.

Emphasis on the deinstitutionalization of persons with mental retardation in the past two decades has resulted in major changes in the approach toward residential care and in the entire service delivery system, including the role of schools and special education. Since the mid-1960s, considerable effort has been directed toward the development and use of alternative residential placements in the community and toward the development and use of alternative training and educational services in the public schools.

In 1982 the median annual per capita cost of care in 36 Minnesota private residential homes for populations with mental retardation was \$20,082 (adapted from primary data in Greenberg, Lakin, Hill, Bruininks, & Hauber, 1985). These costs do not include training or cost of capital facilities. When expressed in 1984 dollars these per capita costs approximate \$22,030.

A recent study by Burchard, Hasazi, Gordon, Rosen, Yoe, Toro, Dietzel, Payton, and Simoneau (1986) indicated that there are not significant differences in average income, or type or extent of employment among individuals with mental retardation within different types of community residences.

Supplemental Income (SSDI/SSI) and Medical Assistance: Follow-up interview data indicated that 88% of all subjects received medical assistance and 88% received supplemental income. Supplemental income from SSDI/SSI and Medicaid/Medicare was estimated to average annually \$2,997 for each subject in the pooled sample. When these transfer payments were extrapolated over an expected work-life of 25 years and discounted at 6%, per capita assistance was estimated to be \$38,312 in 1984 present value.

Special Education Program Costs: Special education costs for each subject were determined from actual school expenditure and student records (Lewis, Bruininks, & Thurlow, 1988B, 1988C). In 1984 dollars per student average annual special and regular education costs for the subjects in this study were estimated to be \$11,220. When these data were compounded over a 12 year schooling period at 6%, 1984 present values were estimated to be \$189,270 in total costs for each student.

special education services for students with severe mental retardation. Results from Table 3-3 indicate that society is likely to benefit in net present value terms by over \$85,000 for each student who might participate in School B as compared to similar services at School A. Net monetary benefits appear to even accrue to individual participants in measure beyond a number of other benefits.

#### Lifetime Institutionalization as an Alternative to Special Education

For purposes of illustration it is possible to assume the hypothetical alternative of offering no special education services in the schools and the institutionalization of all individuals with severe mental retardation at approximately 14 years of age. This hypothetical situation has some basis in reality when one reflects on the status of special education for students with severe mental retardation in the United States at the turn of the century. During the early 1900s, decisions concerning citizens with mental retardation were most often made on philosophical and political grounds, as opposed to empirically based research or economic considerations. Based on the prevailing notion that moral and mental defectiveness were linked, Craig and McCarver (1984) pointed out in their historical perspective on deinstitutionalization that in the early 1900s citizens with mental retardation were regarded as a menace to society. It was believed that persons with mental retardation should be isolated from the community and placed in institutions. In a paper delivered in 1912 by a leading professional to the American Association for the Study of the Feeble-minded, it was stated that persons with mental retardation were "a parasitic and predatory class never capable of supporting themselves or of managing their own affairs . . . a menace and danger to the community . . . a potential criminal" (Fernald, 1912, p. 88). Moreover, historical evidence on persons in institutional settings shows very high rates for individuals who were severely retarded (Scheerenberger, 1983). It is safe to assume that many such individuals in our schools today would have been targeted for such beliefs and subsequent institutionalization during this earlier period.

If institutionalization with its attendant and exceedingly high costs is viewed as the hypothetical comparison, the resulting benefit-cost analysis would clearly favor special education in the schools and deinstitutionalization even if post-school competitive earnings were zero. In Minnesota, the 1984 average annual per capita institutional care costs for persons with mental retardation was \$44,986 (Lakin, Hill, Street, & Bruininks, 1986). As noted in Table 3-4, when these costs with their attendant assumptions were factored into the accounting framework, the net per capita monetary benefit to society for school-based special education was conservatively estimated to be \$252,795 in 1984 present value. All sources and assumptions relating to the estimates for costs and benefits in Table 3-4 are identified in Table 3-6.

In Table 3-4 we have pooled our two previous samples of individuals with severe mental retardation from Schools A and B into one sample of 86 respondents (see Table 3-1 for descriptive information on this combined sample). We are further assuming a hypothetical comparison group of individuals with severe mental retardation who received no special education and who would likely have been institutionalized at age 14 or earlier with no lifetime earnings. This is obviously the most extreme comparison for evaluating the possible benefits of special education services. This hypothetical alternative assumes the

most pessimistic political and social outcome for youth and adults without special education services. The model and illustration presumes that the availability of local special education services would operate to prevent institutionalization and instead would facilitate living, working, and participating within the community at the same rates of community integration as those found in our pooled sample of 86 respondents.

#### Institutionalization at 1965 Rate as an Alternative

The incidence of severe mental retardation in the western world has been estimated to be about .1% of the total population (Abramowicz & Richardson, 1975; Stein & Susser, 1975). Using 1965 population data (Bureau of the Census, 1988) it can be estimated that there were about 193,000 people in the United States with severe mental retardation in 1965. It has also been estimated that in 1965 there were 61,808 individuals with severe mental retardation in state institutions (Scheerenberger, 1965) and an additional 18,290 persons with severe mental retardation in other state and county mental hospitals and private facilities (Lakin, Hill, & Bruininks, 1985). Thus, it appears that at least 42% of all persons (i.e., approximately 80,000 individuals) with severe mental retardation in the United States were institutionalized in some form in 1965.

In Table 3-5 the assumptions of Table 3-4 were modified regarding the possible rate of institutionalization as a comparison for the pooled sample of this study. In Table 3-5 it was assumed that the hypothetical comparison group would have been institutionalized at the earlier 42% rate from 1965. It was further assumed that the non-institutionalized members of the comparison group (a) received no special education, (b) had the same employment and earning prospects as those with special education in the sample, and (c) had no other additional need or access to the use of social services in the community.

From these assumptions, it was estimated for Table 3-5 that at least 42% of the 86 respondents in the sample and living in the community today would have been previously institutionalized. Proportional adjustments also were made in reducing the need for community based residential living costs and transfer payments. Given these changed assumptions, one can re-estimate the net benefits in monetary terms. Implementation of these assumptions for our hypothetical comparison group of 86 individuals with severe mental retardation and no special education indicates that the pooled sample with extraordinary special education costs is only slightly less efficient on a per capita basis. Even in this very conservative example, net monetary benefits of over \$13,000 accrue to individual participants and/or their families.

It is important to reaffirm that the assumptions used in this latter analysis present a conservative case for comparative and illustrative purposes relative to examining the possible benefits of special education. This latter model assumes, for example, that the only monetized benefits to providing special education for the entire sample of respondents results solely from the cost savings that result from not institutionalizing 42% of the sample. It assumes that no other monetized benefits (e.g., drop-out prevention, increased employability, increased earnings, or reduced community support services) result from special education.

These results point out the exceedingly high costs of institutionalization for persons with mental retardation. Assuming that special education services can prevent institutionalization, the results also point out the exceedingly high economic efficiency effect gained from the provision of special education services. It is not unreasonable to assume that special education has had some influence on those factors that lead society to make decisions regarding institutionalization for this population.

## CHAPTER 4

### Conclusions

**Robert H. Bruininks, Darrell R. Lewis, and Martha L. Thurlow**

Follow-up studies of school programs, including special education programs, are being conducted with increasing frequency in recent years. Still, Edgar (1988) has argued that it is important for the field of special education to continue conducting follow-up studies because outcomes in one place or for one program may not concur with outcomes from another place or for another program. Yet, we must look beyond specific studies to generate generalizable notions about effective special education programs compared to ineffective ones. A major problem in attempting to do this, unfortunately, is that there is little in common among different studies that have been conducted to date. Bruininks, Lewis, and Thurlow (1988) noted this when they discussed the possibility of comparing their follow-up study results with the results of other studies:

First, there is not good comparability in available data bases related to the post-school adjustment of individuals with disabilities. Second, environment variables play a large part in influencing outcomes, and thus deserve greater attention. Third, samples from study to study are variable and often are not comparable (p. 224).

This study provides a merged data set that contains information on former students with mental retardation ranging from mild to moderate to severe, who came from different educational environments and who had been out of school for comparable amounts of time (1 to 5 years). Details on the complete samples and findings for a multitude of variables not included here are provided in separate follow-up reports (Hagstrum, 1987; Thurlow, Bruininks, & Lange, 1989; Thurlow, Bruininks, Wolman, & Steffens, 1989). This study also assessed the costs of special education services for these samples and linked these measures to yield benefit-cost and cost-effectiveness analyses for evaluating the possible efficiency of such services in terms of post-school outcomes of young adults with mental retardation.

Findings from this study lead to a number of conclusions. First, environmental variables and opportunity factors do play a significant role in post-school outcomes. Even within the same metropolitan area, employment rates ranged from 50% to 92% for individuals with moderate mental retardation who were served in different school districts. Income per month for those individuals with mild mental retardation who were employed was twice as much for students in one type of community compared to students in the other. Several factors may contribute to such differential outcomes. One possibility is support from the family or other important benefactors (Edgerton & Bercovici, 1976). There is evidence to suggest that many former students with mild and moderate handicaps are assisted by family members, even more than by rehabilitation agencies, in locating post-school employment (Bruininks, Thurlow, Lewis, & Larson, 1988; Thurlow, Bruininks, Wolman, & Steffens, 1989). Since this factor is strongly documented as a contributor to school achievement outcomes (Walberg, 1984) it is reasonable to expect similar contributions to

post-school outcomes for former students with handicaps. Family support or support from important benefactors is just one possible explanation for variation in outcomes across school districts and for individuals within groups. Another factor contributing to these differences may be program effectiveness. Variations in transition programs, for example, have been documented (Benz & Halpern, 1987; Johnson, Bruininks, & Thurlow, 1987). These issues, family/benefactor and school/agencies effects, require further analysis in post-school outcome studies.

Second, differences between males and females are not necessarily maintained in samples of former students with mental retardation. Several previous outcome studies (Fardig et al., 1985; Hasazi et al., 1985; Kranstover et al., in press; Mithaug et al., 1985) have compared males and females on a variety of outcome variables, both employment and social in nature, and have found differential post-school outcomes favoring males over females. These studies, however, focused on individuals with mild handicaps (primarily, learning disabilities). Thurlow, Bruininks, and Lange (1989) found few differences between males and females with moderate to severe mental retardation, and concluded that one possible explanation for differences found by others could be severity of handicap. In the current merged data set, differences in outcomes were notably lacking between men and women even for these former students with mild mental retardation.

Third, a strong factor in predicting economic outcomes for persons with mental retardation is the severity of the retardation. Thus, former students with mild mental retardation earn significantly more, receive significantly smaller amounts of social support payments, and more often have competitive jobs than do former students with moderate retardation, who in turn earn more, receive smaller amounts of social support payments, and more often have competitive jobs than do former students with severe mental retardation. Similarly, economic differences are reflected in shopping and banking activities. Such striking differences are not evident, however, in the social aspects of their lives. Minimal differences are noted in the number and variety of friendships and in the extent to which there is participation in recreation and leisure activities. Perhaps the lack of differences in the social aspects of their lives reflects the greater structure and number of services provided to those with more severe levels of mental retardation. This, in turn, might suggest the need for greater support in the social aspects of the lives of those students with mild mental retardation as they leave school. On the other hand, it may argue for the need for greater support for those with moderate to severe mental retardation in the economic aspects of their lives. It is also possible, however, that the minimal differences in friendships reflect slightly different definitions used by individuals with mild mental retardation (who participated in the interviews themselves for the most part) and informed respondents for individuals with moderate and severe mental retardation (who may be more encompassing in their definitions of friendships). These possible differences certainly are worthy of further investigation.

Fourth, there is a need for location-specific information on outcomes (particularly, employment rate) for comparable age groups without handicaps. When examined in comparison to outcomes for individuals 18-24 years old in the same metropolitan area, the unemployment levels for the former students in the current samples were quite high, certainly higher than the 4-5% rate documented for the population overall. Further,

information from the interviews suggested that many of those individuals in competitive employment jobs actually were working less than 20 hours per week. There is a clear need for more intensive studies of the nature of employment levels, and possible assistance in acquiring and maintaining employment. With the emergence and expansion of supported employment training models, further research also is needed to assess the contribution of service support strategies to the long-term employment outcomes of persons with mental retardation.

Fifth, the use of effectiveness-cost and benefit-cost evaluation techniques for estimating the benefits and costs of public school special education programs for persons with severe retardation indicated that with appropriately identified, measured, and valued costs and benefits, it is possible to employ both effectiveness-cost and formal benefit-cost frameworks to assess the efficiency of special education services. These analyses suggested that one special education service program produced more positive outcomes per unit of cost than a comparison special education program in another district. Other evidence demonstrated the potential economic benefits and savings to society of preventing long-term institutionalization through provision of special education services to students with severe levels of mental retardation. Such models and economic analyses provide insight into not only those benefits and costs that can be monetized, but also into many other effects that cannot be valued in terms of money alone. They can be used, for example, to evaluate other important benefits such as work preferences and prospects for increased community adjustment, self-sufficiency, self-esteem, and quality of life.

This study attempted to expand existing research on the post-school outcomes of young adults with mental retardation. It used a wide variety of measures, special procedures to enhance response rates and participation, and provided comparison analyses by level of mental retardation, gender, and community location of the special education program. A unique aspect of this study was the application of effectiveness-cost and cost-benefit methodologies to combine measures of outcomes with the expenditure of public resources.

Are we "getting our money's worth" from special education services and programs in our public schools? Beyond employment data, little information of a systematic nature has been collected on the economic benefits or efficiency effects of school based special education programs. The basic questions in these analyses examined (a) whether a particular program of special education services might be more efficient than another alternative with similar goals, and (b) whether special education for youth with severe mental retardation might be worth its cost when compared with a number of hypothetical comparison groups presumed to be without the benefit of special education services.

Unfortunately, the results of these comparisons are limited for making reliable generalizations because of design problems with the comparison groups. The absence of randomly constituted comparison groups and longitudinal data collection obviously compromised the findings in this study. Nevertheless, the illustrations presented do give vivid detail to the importance of both the techniques and many of their critical assumptions. Moreover, the illustrations employed give us tentative estimates that special education services for persons with severe retardation may be more cost-effective and cost-beneficial

when compared with a number of alternatives. When historical data were used for hypothetical counterfactual comparison groups, for example, it was possible to examine a number of alternative hypotheses concerning the likely post-school effects for individuals without special education services. Various rates of institutionalization and community integration were examined as hypothetical comparisons to provision of special education services for a sample of youth with severe retardation. The resulting benefit-cost estimates, despite some obvious methodological problems, indicate the likely economic efficiency of special education for the individuals in our sample.

Clearly, more work needs to be done with the use of effectiveness-cost and benefit-cost analyses in examining these questions. The most promising applications of this approach would involve comparisons of alternative treatments or strategies in which individuals have been assigned randomly to different programs, interventions or treatments (see, for example, Kerachsky et al., 1985). This design, seldom used in research on education and other social service programs, offers the potential to assess efficiency considerations in the operation of services, and whether alternative programs for comparable persons achieve the most efficient use of resources in producing desirable outcomes. Although a weaker paradigm, some useful results may still accrue from the application of effectiveness-cost assessments to naturalistic settings of alternatives and of benefit-cost analyses using hypothetical comparisons, provided that sound historical data are available to assess possible alternatives. The principal benefit to special education from such analyses is the focus on the assessment and usage of resources, the development of a framework that specifies important monetary and non-monetary program outcomes, and the relationship of resources to outcomes. Such analyses force administrators, and policy makers to address questions of resource usage in relationship to expected post-school benefits for students with handicaps.

On the whole, even the individuals with moderate and severe mental retardation in the current study were functioning at relatively high levels in their home communities. They had adaptive skills, friends, access to community resources, and mostly lived in neighborhoods. On standardized measures, their motor, personal, social/communication, and community skills, combined with their maladaptive behaviors, placed them at an average service level need of "regular care/support." "Limited care/support" was indicated for those with moderate mental retardation, and nearly "independent" was indicated for those with mild mental retardation. These indicators of needed support would question whether the reported outcomes are satisfactory, given the predicted levels of independence and service need. The economic analyses, while clearly providing support for the potential benefits of special education in reducing costly dependency, indicated that outcomes of educational and training programs do not function with equal efficiency or effectiveness.

The measurement of efficiency and effectiveness of service programs, and long-term outcomes and adjustment of persons with mental retardation is a promising area of research. Through further research and improved service initiatives, factors that contribute to the quality of life can be better understood and enhanced for persons with mental retardation.

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